

**Maine State Housing Authority**

**Construction Services**

**Design & Construction Manual**

**February 2006**

# **Maine State Housing Authority - Construction Services Design & Construction Manual**

## **PREFACE**

This Design and Construction Manual (Manual) has been assembled for use by Maine State Housing Authority (MSHA) staff, Authority Partners and their agents who are participating with the MSHA in the development of safe and affordable housing through their applications for various funding sources administered by MSHA. The material contained herein shall be used as a guide in the design and development of new and rehabilitation projects under the various programs administered by MSHA. It is the intent of this manual to assist our partners by outlining MSHA's expectations to ensure a basis for providing safe, sanitary, cost effective, energy efficient, and decent housing for all occupants as well as protecting the Authority's security interests in the property.

The use of the word "shall" implies that strict conformance to a standard or procedure is required by MSHA; the use of the word "should" is a strong suggestion that a standard or procedure be appropriately considered. The use of Maine State Housing Authority, MSHA, and/or the "Authority" all reference the Maine State Housing Authority.

This handbook has been divided into three parts plus an appendix section: Part One contains the Design and Construction Standards to be used in the development of contract documents; Part Two contains the Design and Construction Document requirements and document submittal procedures; Part Three discusses the project delivery processes and procedures. The appendix section contains additional information that is referenced in the body of the handbook.

This Manual has been generated in an effort to provide a quick and easy reference for interested parties concerned with the design and construction of housing projects administered by MSHA and supersedes all previous editions and/or publications printed to date.

Final interpretations, variances, clarifications, amendments, etc. related to this manual shall be made only by the written approval and/or authorization of the Construction Services Department of the Development Division of the Maine State Housing Authority.

# CONTENTS

	<a href="#"><u>Preface</u></a>	
<b>PART 1</b>	<a href="#"><u>Design And Construction Standards.....</u></a>	<a href="#"><u>1</u></a>
	<a href="#"><u>A. Introduction .....</u></a>	<a href="#"><u>1</u></a>
	<a href="#"><u>B. Architectural Services.....</u></a>	<a href="#"><u>1</u></a>
	<a href="#"><u>C. Codes .....</u></a>	<a href="#"><u>1</u></a>
	<a href="#"><u>D. Site Design Standards.....</u></a>	<a href="#"><u>3</u></a>
	<a href="#"><u>E. Building Design Standards .....</u></a>	<a href="#"><u>7</u></a>
	<a href="#"><u>F. Construction Standards .....</u></a>	<a href="#"><u>12</u></a>
<b>PART 2</b>	<a href="#"><u>Design And Construction Documents .....</u></a>	<a href="#"><u>1</u></a>
	<a href="#"><u>A. Introduction .....</u></a>	<a href="#"><u>1</u></a>
	<a href="#"><u>B. Concept Submission - 1 Copy For MSHA .....</u></a>	<a href="#"><u>1</u></a>
	<a href="#"><u>C. Design Development Submission - 1 Copy For MSHA .....</u></a>	<a href="#"><u>4</u></a>
	<a href="#"><u>D. Construction Documents - 1 Copy For MSHA .....</u></a>	<a href="#"><u>9</u></a>
	<a href="#"><u>E. As-Built Documents - 1 Copy For MSHA .....</u></a>	<a href="#"><u>16</u></a>
<b>PART 3</b>	<a href="#"><u>Project Delivery Methods .....</u></a>	<a href="#"><u>1</u></a>
	<a href="#"><u>A. General .....</u></a>	<a href="#"><u>1</u></a>
	<a href="#"><u>B. Design – Bid – Build.....</u></a>	<a href="#"><u>1</u></a>
	<a href="#"><u>C. Construction Manager - At - Risk.....</u></a>	<a href="#"><u>2</u></a>
	<a href="#"><u>D. General Conditions Of Construction And Quality Control.....</u></a>	<a href="#"><u>4</u></a>
	<a href="#"><u>E. Project Close-Out.....</u></a>	<a href="#"><u>7</u></a>

## [Appendix A MSHA Green Building Standards](#)

## [Appendix B Certifications:](#)

- A. Concept Design
- B. Construction Documents
- C. Construction Completion
- D. Real Property Survey

## [Appendix C Project Close-Out Checklist and Forms:](#)

- A. Construction services Final Completion Checklist
- B. Certificate of Completion of Design Professional
- C. Contractor's Final Certificate and Release
- D. Incomplete Work Escrow (IWE)
- E. Owner/Agency Certificate of Completion
- F. Contractor's Report of Participation W/M

## [Appendix D AMENDMENTS](#)

# **PART 1**

## **DESIGN AND CONSTRUCTION STANDARDS**

### **A. INTRODUCTION**

This manual establishes both general and minimal criteria for design, construction, and project delivery for both the new construction and rehabilitation of multi-unit housing developments processed through MSHA. The primary objectives of this manual are to standardize procedures for the design and construction and to aid the design professionals and owners in preparing complete submissions that will allow smoother processing and construction processes. Portions of this manual are applicable to all projects and, therefore, other manuals may be issued for clarity to better align with specific programs administered by MSHA. The Authority recognizes and endorses the use of national, state, and/or locally adopted building, plumbing, electrical, fire protection, and engineering codes and standards. In addition, the Authority requires full compliance with state and local standards for zoning and subdivision regulations. In general, the Authority's standards and/or procedures are meant to complement or supplement any national, state, or local regulations. *In any situations where duplication occurs, the more stringent standard or procedure shall apply.*

### **B. ARCHITECTURAL SERVICES**

All construction drawings and specifications shall be prepared, completed, and be certified in accordance with State of Maine Statutes by a professional architect licensed in the State of Maine. All other design professionals involved with a project are to be responsible to the architect, the primary designer of record. Such supplemental professionals may include surveyors; landscape designers; interior designers; civil, structural, mechanical, and electrical engineers.

It is suggested that an Owner-Architect Agreement be executed for all design services to be performed on MSHA projects. Owner-Architect Agreement, AIA Document B181, is a suggested format acceptable to the Authority.

The scope of the architectural services shall include:

1. All architectural, structural, mechanical, electrical, civil, landscape, and other consulting services necessary to clearly identify the requirements for construction of the project. The scope of services must include provisions for the administration of the construction contract.
2. The Architect-Owner Agreement shall delineate the responsibility for the services to be provided whether by the architect, owner, or others.

### **C. CODES**

The Maine State Housing Authority uses standards of design and construction as part of the implementation of its programs to develop safe housing that will serve the needs of its inhabitants with as much quality as the market place, resources, and need will permit. Unless required by local authorities, all design and construction shall be performed in accordance with the following minimum codes and/or standards:

- \* NFPA 101 Life Safety Code (current edition 2003) ..... State Standard
- \* NFPA 211 (chimneys, etc.) 2003 ..... State Standard
- \* NFPA 1 Fire prevention Code 2003 ..... State Standard
- \* 1999 BOCA Building Code ..... MSHA Minimum Standard  
(NOTE: If in there is a conflict with locally adopted municipal Building Code, the stricter Code or Standard shall apply.)
- \* IBC 2003 (International Building Code) (NOTE: State level as a model only. If local municipalities elect to update to, or adopt a Building Code, they must adopt the 2003 IBC though it may be amended at will.)
- \* IEBC 2003 (International Existing Building Code) (NOTE: State level as a model only.)
- \* State Plumbing Code ..... State Standard
- \* National Electric Code (2005 edition) ..... State Standard
- \* Maine Energy Standard ..... State Standard  
(NOTE: Standard developed by International Energy Conservation code 2003)
- \* ADA ..... Federal Requirement
- \* ICC/ANSI A-117.1 2003 ..... State and Federal Requirements
- \* Fair Housing Act (design manual) ..... Federal Standard

#### Accessibility Laws, Regulations, and Minimum Standards:

Compliance with all existing laws and regulations is the responsibility of the owner and design professional. MSHA, in keeping with the harmonization of the U.S. Access Board, model codes and key industry standards, has adopted the accessibility requirements of the 2003 IBC, Chapter 11 and the technical requirements of ICC/ANSI A117.1-2003, "Accessible and Usable Buildings and Facilities" as well as the requirements of the 2004 ADA/ABA Accessibility Guidelines. In addition, certain provisions of the Fair Housing Act (FHA) the Fair Housing Accessibility Guidelines (FHAG) and the Maine Human Rights Act (MHRA) shall also be considered as defined below.

All common areas and public spaces shall meet the requirements of the 2004 ADA/ABA AG as well as ICC/ANSI A117.1-2003.

The 2003 ANSI defines four types of Dwelling Units for purposes of accessibility:

- Section 1002 Accessible Units
- Section 1003 Type A Units
- Section 1004 Type B Units
- Section 1005 Units with Accessible Communication Features

There are three levels of accessibility that may be required in a dwelling or sleeping unit which are generally summarized as follows:

**Accessible** units, **Type A** units and **Type B** units. An **Accessible** unit is constructed for full accessibility in accordance with the requirements in Chapters 3 through 9 of ICC A117.1. For example, grab bars are installed in the bathrooms, a clear floor space is provided for front approach at the kitchen sink and bathroom lavatories, 32-inch (813 mm) clear width doors with maneuvering clearances and lever hardware are provided, etc. None of the elements in the unit are constructed for adaptability. The requirements for an Accessible unit are more restrictive than either a Type A or a Type B unit.

A **Type A** unit has some elements that are constructed as fully accessible (e.g., 32-inch (813 mm) clear width doors with maneuvering clearances and lever hardware) and some elements designed to be altered when needed (e.g., blocking in the walls of the bathroom for future installation of grab bars). This type of unit is less accessible than an Accessible unit and more accessible than a Type B unit.

The scoping or technical requirements for Type B units are consistent with the requirements for units required by the FHAG. A **Type B** unit is constructed to a lower level of accessibility than either an Accessible unit or Type A unit. While a person who uses a wheelchair could maneuver in a Type B unit, the technical requirements are geared more towards persons with mobility impairments. Areas of a Type B unit may be totally non-accessible (e.g., sunken living room, extra bedrooms on a mezzanine level). Side approach is permitted to sinks in the kitchen and lavatories in the bathroom rather than planning for a front approach. Some elements are constructed with a minimal level of accessibility (e.g., doors within the unit are 31 3/4-inch (806 mm) clear width but do not require maneuvering clearances), while some elements are designed to be altered when needed (e.g., blocking in the walls of the bathroom for future installation of grab bars).

This section also takes into consideration the fact that Accessible unit requirements are more stringent than Type A requirements, and Type A requirements are more stringent than Type B requirements. Units are permitted to be constructed to a higher level of accessibility than required.

The scoping requirements of the MHRA will determine the number of Type A units, typically no less than 10% of the ground level units and a minimum of 10% of the upper story units connected by an elevator when the project is new construction and contains 20 or more units. Renovations of over \$100,000.00 at projects of 20 or more units shall have at least one Type A unit for each multiple of 20. The MHRA requirements of 10% exceed the 5% requirement of Section 504 where federal funds are used, but the threshold for Section 504 is five or more units, so 5% would apply for projects between 5 and 19 units, meaning a minimum of one unit.

MSHA will require that a minimum of 50% of the units required to be Type A shall be provided with the bathroom grab bars installed as required for full accessibility, not just the blocking for future installation of grab bars. All Type A units shall be provided with roll-in type shower compartment.

MSHA will require that at least 2%, but no fewer than one unit, of the total number of all residential dwelling units comply with Section 1005 Units with Accessible Communication Features in projects of five or more units.

The scoping requirements of the FHA require all covered units in new construction of 4 or more units to be adaptable. The ANSI Type B unit meets this requirement. Therefore the FHA may require all units in a project to be Type B while more stringent Type A units will be required by MHRA and Section 504.

#### **D. SITE DESIGN STANDARDS**

Buildings should be planned and located so that the spaces between them become positive elements in the site plan, and not just leftover portions of the site which happen not to be

occupied by buildings. In this way, land which is defined by natural or man-made features, and developed purposefully, will contribute to the lives of the inhabitants by permitting fuller use and enjoyment of a site, by adding to a sense of belonging and pride among the residents, by offering increased privacy, and by decreasing maintenance needs caused by vandalism and misuse. Buildings, roads, parking areas, recreational facilities, paths, and landscaping of plants and site furnishings shall be related properly to each other, the sun, natural features, topography, and views on and off the site, in a well designed assembly that enhances their utility and enjoyment. Proper site design should address and/or incorporate the following:

- a. PRIVATE OUTDOOR SPACE directly associated with each dwelling, should be provided in single family, semi-detached, row house, and walk-up apartment structures. By extending the sense of belonging for each inhabitant beyond the front and back doors of each living unit, the life of an individual should be integrated within the community in a series of related steps leading from:
  1. the intimate privacy within the dwelling unit itself, to
  2. the more public use of private outdoor space, to
  3. the areas shared, used, and thus belonging to a group of neighbors, to
  4. the residential district of the municipality within which the site is located, and which may share schools, churches, shopping facilities, road access, or other features, and on to
  5. the village, town, or city itself.

This progression of elements, the relation between them, and the design of each, should be arranged to provide an ordered linkage between the individual, the development, and the community in which it is located. Private outdoor spaces shall be located and designed in a manner suitable to the uses expected to be made of it. Areas of each space shall be appropriate to the size of the site, building coverage, and dwelling type. Private outdoor space may occur as an entrance way, an outdoor patio or play area, or other definable space. It may be integrated with service needs such as driveways, walks, storage, trash bin shelters, and drying lines. It may be defined by these elements as well as by door locations, building jogs, plantings, fences, parking areas and other features. A protected space should be provided for each family unit suitable as a play area for young children and located to permit ready observation from the kitchen or living areas of the dwelling. Particular attention shall be paid to the orientation of these spaces to summer and winter sun.

- b. VEHICULAR means of access and egress for inhabitants, visitors, and service needs shall not disrupt the privacy, well-being, or the safety of the inhabitants.
- c. PEDESTRIAN AND VEHICULAR means of access and egress shall be separated to ensure the safety of the inhabitants. Pedestrian paths and recreation areas must be related to allow ease in access to eliminate vehicular impediment. Family housing developments must address this requirement in order to ensure an appropriate design for children leading from dwellings to recreation areas, to school bus stops, and to municipal streets.
- d. PARKING required for any dwelling unit shall not be permitted on any street designed for acceptance by the municipality, nor will a site scheme be permitted

with off-street parking when the street has been accepted by the municipality. Parking should be so arranged or screened such that nighttime headlights will not shine at unit windows. Parking areas should be located and sized appropriately in order to prevent large massings of undesirable asphalt. As a Minimum, 1 parking space per unit shall be provided. Parking should not be aligned with buildings, nor shall it intrude upon portions of the site designed for living and recreation. Parking lots of an area and location which dominate the dwellings are not acceptable.

- e. OUTDOOR RECREATION FACILITIES should be provided for common use consistent with the needs and size of each project and its site characteristics. All equipment shall be constructed for durability, resistance to vandalism, and assure low maintenance. Play grounds should be located to avoid hazards, and to provide accessibility, opportunity for parental supervision, and protection of privacy, of nearby inhabitants. Proximity to common laundry facilities or other community centers should be considered. Recreational facilities for elderly use should be related appropriately to outdoor seating areas, community facilities or other focuses of social gatherings. Gardening plots, playing fields, scenic walks or other features should be considered.
- f. COMMUNITY FACILITIES may be required by the Maine State Housing Authority for clothes washing, social gathering, maintenance storage, management offices, or other needs. Community facilities should be designed to create a space for multi-purpose functions and to advocate an extension of the individual units for a sense of neighborhood association.
- g. OUTDOOR LAUNDRY DRYING LINES should be provided for all dwellings in single family, semi-detached and row house structures and are encouraged for all multi-family (either elderly or family) projects. They should be located or screened so as not to be in prominent view. Their location should be coordinated with other outdoor features like fencing or storage sheds so as to reduce the visual importance they would have as isolated features.

The elderly housing requirement is:

50 linear feet per unit

The family housing requirement is:

50 linear feet per unit plus 25 linear feet per bedroom

Common drying line facilities located convenient to common laundries and of a size acceptable to the Authority may be required in other types of housing structures. No lines shall be closer than six inches. Support for non-shrinkable lines shall be durable and strong enough to withstand wind, the weight of the clothes and normal wear and tear without destruction. Common facilities may be allowed when requested by the applicant. The larger the drying facility is, the greater the requirement will be for screening, to prevent an undesirable condition.

- h. GARBAGE AND TRASH FACILITIES shall provide sufficient volume for materials accumulated between collections. Dumpsters shall be used only for



family housing if regular municipal collection service is not available and the dumpster service is available locally. Cans will be permitted for elderly housings. The separation and collection of recyclable materials of all kinds is encouraged. If local, no cost for collection, collection services are available for recyclables, then adequate containers and/or storage of recyclables shall be provided.

Dumpster container capacity:

One cubic yard per four bedrooms of the living units served.

Garbage can capacity:

One – 20 gallon can/week for each bedroom of the living units served.

Enclosures shall be provided for all containers to maintain orderly collection, neat appearance, and sanitary conditions; shall deter access by animals; shall minimize hazards to playing children; and shall provide protection from rain and snow. Locations and numbers shall be convenient to the inhabitants served and accessible to the collecting vehicle, but shall be placed, screened or related to other facilities so as to be unobtrusive. Any projects of 30 or more units housed in one building should consider a trash compactor, trash room, and trash chute centrally designed for ease of tenant use. These facilities shall be sized in accordance with anticipated tenant demands

- i. MAILBOXES must be supplied and their type and location must be verified by the local post office. If provided in centralized outdoor locations, mailboxes should be accessible to the mail carrier, convenient to the inhabitants, and located, screened or related to other facilities so as not be obtrusive.

Preferably, centralized mailboxes shall be placed so that their use becomes a definite public activity. Successful design implementation has been proven in cases where mailboxes have been integrated with high traffic areas and sitting arrangements, i.e., the community spaces. In the case where elderly projects do not have community spaces the location for the mailboxes should be integrated with the space allocated for laundry services. This provides a sheltered location and maximizes the utilization of the space.

- j. EXTERIOR LIGHTING shall be provided for walkways and parking areas independent of unit lighting and shall be integrated with features of the site to provide a coordinated, harmonious and uncluttered streetscape. Light shall not shine intensely upon windows of dwellings. This requirement is to incorporate light into undistinguishable areas for defensible space as well as general illumination for the safety of the inhabitants. All light pole bases should be located away from potential damage from vehicles or be otherwise protected. SEE MSHA'S GREEN BUILDING STANDARDS FOR FURTHER REQUIREMENTS.
- k. TREE species shall be selected for form, size and rate of growth to provide for the sheltering of unwanted summer sun, usually mid-day and late afternoon, and for the admission of winter sunshine. The species shall be selected according to color, texture, and other features which will enhance the attractiveness of the site

and shall be native species suitable for the geographical areas under consideration and preferably require no irrigation. Root structures shall be considered for space needed, effects on nearby pavements, and possible interference with subsurface utilities. They shall be sized according to proper planting practice, and shall be adequate to withstand normal abuse. SEE MSHA'S GREEN BUILDING STANDARDS FOR FURTHER REQUIREMENTS.

- I. SOLAR ACCESS and passive solar heat gain should be considered for all south facing facades.

## **E. BUILDING DESIGN STANDARDS**

The Maine State Housing Authority also requires construction which provides the greatest durability and economy over the life of the project consistent with other needs. To these ends, MSHA has identified a number of specific features which must be included in each project. Design submissions shall demonstrate compliance with these specific requirements and shall respond to the preferences listed below.

### **1. BUILDING TYPE**

- a. SINGLE FAMILY DWELLINGS are preferred only for locations where the surrounding neighborhood has a prevailing single family residential character which would make more intensive forms of development appear out of place, where site area permits adequate space for each living unit whether directly associated with it or in common use. Elderly housing, however, should not be designed for single dwelling structures.
- b. SEMI-DETACHED PAIRS OF DWELLINGS with living units side by side are acceptable whenever they are with compatible surrounding neighborhood integrity, site layout, and land and construction costs. All dwellings shall have individual entrances.
- c. DUPLEX apartments, one above the other, will generally not be acceptable to MSHA unless unique characteristics of topography, site area, or construction technology clearly show that such a form would be the most suitable. If duplex apartments are constructed for family use, they shall have separate entrances from the outdoors.
- d. ROW HOUSE dwellings may be used whenever they are compatible with surrounding densities, the economies of construction, the resulting open space, the centralization of utilities, and/or other considerations which make this building type the most suitable for the site. Whenever row houses are used, building massing, number of dwellings, and building relationships with other features shall be designed to reduce the extended repetition of multiple units, and the sense that numbers and building overwhelm an individual dwelling. In general, no building should contain more than five dwellings unless local features make this limit impractical.

Each dwelling shall be identifiable from the outside of the building and shall be distinguishable from adjacent dwelling by such features as changes of building line, entrance way, stair tower, window lines, finish materials, roof lines,

plantings, or walks. Two entrances should be provided to each dwelling and shall relate private outdoor space with the dwelling interior and the exterior features which define it for the enhancement of privacy and identity of the inhabitants.

- e. WALK-UP apartment buildings with some living units located over others should be avoided, unless MSHA determines that they are preferable because of site area, dwelling numbers, surrounding densities, or building technology. Elderly units, though not a preferred unit type as units without stairs are preferred, if accepted, shall not require climbing more than one story. If walk-up apartments for family use are accepted, they should be designed without extended corridors, and with separate entrances for each living unit. Entrances, halls, stairs, and doors leading to living units should be designed to provide each apartment, or group of apartments served in common, a sense of community and shared responsibility for those areas. Outdoor stairs and balcony landings, sheltered against rain and snow, and providing doors to individual living units shall be appropriate to reinforce a sense of privacy for each dwelling. The relationships of windows and doors to halls and stairs shall be designed to give privacy to the inhabitants by screening doorways from incidental passage and public view.
  - f. LOW RISE AND/OR HIGH RISE buildings shall be considered by the Maine State Housing Authority to be appropriate when land cost, site area, number of dwellings and surrounding densities require low/high rise construction. Low/High rise structures with a block mass that, in the opinion of the Maine State Housing Authority, overwhelms the scale of nearby development will not be acceptable.
2. BUILDING FORM
- a. ORIENTATION of building access, public passageways, places for social gathering, common facilities, dwelling entrances, rooms and windows shall be related to sun directions, prevailing seasonal winds, views, nearby land uses, topography, natural features, vegetation, roads, drives, parking, recreation areas, other common facilities, walks, outdoor areas, or any other features as they may together improve the quality and preserve the privacy of the lives of the inhabitants. Living Units should be orientated with daytime living portions related to the sun to capitalize on passive solar heat. They should also be oriented wherever possible to provide view for the day time living portions of each dwelling of any areas on or off the site where interesting activity may be observed consistent with privacy.
  - b. SHADE of buildings shall be designed to be appropriate to nearby existing development, to each other, to site improvements, and to natural features. Sunlight, protection from winter winds, exposure to summer breezes, and views shall be considered. A major consideration in the design shall be given to sun orientation to obtain the maximum amount of passive solar energy.
  - c. ACCESSIBLE units shall be provided in accordance with Maine Law and this manual. All buildings shall be designed to facilitate access. Accessible units shall

be distributed among the various types and sizes of dwellings included within each development.

3. BUILDING DESIGN

- a. BASEMENTS may be provided for all family housing unless determined by the Maine State Housing Authority to be impractical because of terrain or underlying soil conditions. For buildings without apartments stacked one above another, cellars shall be divided along the same walls separating the dwellings above, and accessible for the private use of each dwelling as well as by individual bulkheads, areaways, or other openings to the exterior. If cellar stairs provide direct access from an exterior door to the cellar at least three feet wide, and without crossing a habitable room, a bulkhead or areaway may not be required. Private cellar spaces shall not be inter-connected. Areas containing plumbing, mechanical, or electrical equipment used in common by more than one dwelling shall be separately enclosed and accessible to the exterior without passage through a dwelling. All buildings with apartments stacked one above another and with basement areas shall have private storage areas securely enclosed and lockable, with a volume for each dwelling at least as great as required for secondary storage in the following section.
- b. CRAWL SPACE FOUNDATIONS should be avoided wherever possible. If determined to be necessary, they shall include adequate provisions for controlling ground laden moisture and thermal conductivity and heat losses.
- c. STORAGE for all dwellings shall be provided in accordance with the following schedule:

GENERAL STORAGE REQUIREMENTS  
(in cubic feet)

<u>Dwelling Size</u>	<u>Elderly</u>	<u>Family</u>
0 Bedroom	200	----
1 Bedroom	200	200
2 Bedrooms	275	475
3 Bedrooms	----	625
4 or more Bedrooms	----	775

Both primary and secondary storage shall be provided within the elderly dwelling unit.

Primary and secondary storage shall both be provided for each family dwelling unit. Primary storage shall be located within the living unit in a heated space. Secondary storage shall be located in the same building as the dwelling, and accessible to an inhabitant without unsheltered outdoor passage. While secondary storage may be added directly to and combined with primary storage, it may also be provided by a required cellar area or in basement storage cubicles. A least 40% of the family storage requirements

must be met within heated space accessible from within the living unit. Primary and secondary storage volumes less than four feet or more than eight feet in height, or more than four feet in depth without two feet of access space shall not be included within the required volume. Storage area requirements shall not include access space and/or door swing space.

- d. UTILITIES shall be centralized wherever practicable to realize economies of efficiency in operation or maintenance. Layout of electrical distribution and, where possible, heat and water systems shall be designed for separate metering whenever differential rates do not cause separate metering to be more expensive, in which case the installation shall be readily convertible to separate metering in the future.

Utility meters are required to have exterior reading devices to eliminate the necessity of entering individual unit(s).

Electrical utility entrances including telephone, cable TV, internet, and power shall be underground leading from a point where overhead service does not intrude upon the residential scale.

- e. WASHER AND DRYER hookups should be provided in each living unit of family housing, including non-combustible (metal) dryer vents ducted full sized to the exterior, and which are equipped with self-closing dampers. High rise and other elderly housing units without washers and dryers provided within the living units shall have common laundry facilities provided. All dryers shall be vented full sized to the outside. The number of washers and dryers for common laundries shall be based on one washer and one dryer for every ten units in family housing and one washer and one dryer for every twenty units in elderly housing.
- f. DRINKING FOUNTAINS OR COMMERCIALLY SUPPLIED BOTTLED WATER STATIONS shall be provided in all projects which have community facilities. These fountains/stations are to be accessible to the accessible.
- g. TELEPHONE systems shall be pre-wired in suitable proximity to likely placement of furniture. Outlets are to be located in all of the following spaces:
  - 1. Master Bedroom
  - 2. Living Room or Corridor or Dining Room
  - 3. Kitchen
- h. TELEVISION master antenna systems, master satellite systems, and/or Cable TV systems shall be provided in all projects in an appropriate location for viewing and likely furniture placements. Jacks shall be installed in all of the following spaces:
  - 1. Master Bedroom
  - 2. Living Room

- i. INTERNET ACCESS shall be pre-wired and be available in the same spaces as the TV and/or Telephone systems. All pre-wiring shall be compatible with the local service provider(s).
- j. RANGE HOODS shall be provided in each kitchen over the range, be vented full size directly to the outside, and be equipped with a damper which is self-closing when the fan is not in operation. Ductwork runs shall be as short as possible and with as few elbows as possible to assure proper fan operation. All ductwork shall be concealed within the living unit. Ductwork should be within heated spaces to eliminate condensation problems.

In accessible units a separate wall switch mounted for easy accessibility for a wheelchair occupant shall be provided for and wired to the range hood and light. This switch is to be in addition to the integral switch provided with the fixture.

- k. KITCHEN EQUIPMENT shall be provided for all dwellings and shall include a cook top and oven, or a range with oven, and a refrigerator. Specifications on ranges should include front mounted controls for accessibility in elderly and required accessible units only. Selection of residential kitchen appliances shall be based on number of residents. Generally minimum size of refrigerators shall be as follows:

0 and 1 bedroom units	12.5 cu feet usable
2 and 3 bedroom units	15.5 cu feet usable
4 bedroom units	17.5 cu feet usable

- l. Ranges shall be provided with a minimum of 4 burners and a full sized oven for all living units with bedrooms. In zero bedroom units, smaller cooking facilities will be reviewed on a case by case basis.
- m. FIRE AND SOUND TRANSMISSION minimum ratings shall be strictly observed. Plans shall clearly indicate typical wall and floor sections, ratings and their locations to demonstrate full compliance with codes and standards. Particular attention shall be paid to the installation of mechanical and electrical items in fire and sound walls such that the ratings are not compromised.
- n. FOR UNITS SERVING SENIORS, bathrooms should include the following features:
  - Bath doors should swing out.
  - Water closets should have 17" rim height
  - Water closets should be located in corner with adequate adjacent wall space to facilitate future installation of grab bars
- o. STRUCTURES PROPOSED FOR REHABILITATION must meet or be rehabilitated to meet all of the new construction codes and standards contained herein, wherever possible. Re-use of existing materials, i.e., doors, windows, siding, roofing, structure, woodwork, finishes, etc., will be judged on a case by case basis utilizing the new construction criteria as a reference point. It should be further noted that rehabilitation projects present unique mechanical, structural, and fire stopping characteristics that will be upgraded to the latest standards in

every instance. Consideration must be given to the needs to provide extermination services for all proposed buildings prior to the rehabilitation construction.

## **F. CONSTRUCTION STANDARDS**

In addition to the requirements set forth above, MSHA has determined that certain materials, installations, and construction practices are appropriate to the quality of the developments it wishes to construct, uneconomical when considered over the life of the project, or are the cause of reoccurring problems. In addition, the Authority has identified certain materials and/or construction practices that have proven performance and durability and, therefore should be part of projects. The items that have been identified have been arranged in accordance with the Construction Specifications Institute (CSI) headings for convenience. Lastly, MSHA has presented and adopted a set of "Green Building Standards," a copy of which is provided in the appendix of this manual. Full compliance with these standards is mandatory.

### Division 1, General Conditions

1. AIA A201 General Conditions shall be used for all major construction projects.
2. Generally the G.C. will be required to furnish surety in the form of 100% Performance & Payment bonds in favor of the Owner and MSHA or, in certain situations and at the sole discretion of the Authority, an Unconditional Irrevocable Letter of Credit (LOC) may be required. Decisions of the form of security will be made on a case by case basis and the general evaluation criteria for these requirements will be based on the value of the proposed work scope as follows:

Up to \$150,000 of construction value – no bonds or LOC are required  
\$150,000 to \$300,000 of construction value – bonds or LOC may be required.  
Over \$300,000 of construction value – bonds or LOC are required.

- For projects when MSHA accepts a LOC in lieu of bonds, the LOC shall equal 20% of the construction contract and shall be in place until MSHA's determination that the work is complete and acceptable. A LOC in the amount of 5% of the construction contract shall be secured during the warranty period for projects allowed to use the LOC form of surety.
3. All multi-family or licensed facilities must be reviewed by and permitted by the State Fire Marshal.
  4. A copy of the geotechnical report shall be included in the project manual.
  5. The owner shall retain a qualified testing agency to monitor and test all critical structural soil fills, concrete, and/or steel.
  6. Manufacturers' instructions shall be followed for the installation of all materials, products, and equipment furnished with instructions. All instruction, specification, and data sheets normally supplied by a manufacturer shall be submitted to the architect before any request for inspection of work incorporating the material, product or equipment.
  7. Concrete placement records shall be provided by the contractor to the Maine State Housing Authority of all slump and strength tests required in accordance with ACI documents. At a minimum there should be one strength test for each 50 cubic yds. or fraction thereof of material place in any one day. Three (3) test cylinders constitute one strength test; one cylinder is tested at 7 days for information only; 2

cylinders are tested at 28 days to determine acceptance. It is recommended that a fourth cylinder be cast in case a 56 day test is necessary.

8. MSHA encourages all parties responsible for the construction of its projects to make efforts to separate and recycle construction debris. Examples of materials that should be evaluated include wood products, gypsum wallboard, metals, wire, glass, cardboard, concrete and masonry, and stumps. Contractors are encouraged to develop a Waste Management Plan for each project.
9. MSHA encourages all parties responsible for the construction of its projects to develop an indoor air quality management program. The plan should address the protection of HVAC equipment and distribution systems, protection against water damage for all items stored at the site, maintaining appropriate environmental controls for the work at hand most specifically for proper applications for finish materials, and general housekeeping procedures to assure a safe working environment.

#### Division 2, Sitework

1. The owner shall retain a qualified testing agency to monitor and test all critical structural fill.
2. Provide positive drainage away from all buildings – 6” pitch in first 10 feet is recommended.
3. Styrene or corrugated polyethylene piping may be used for foundation drains, leaching fields, or other below grade applications only when the materials and its installation are in accordance with ASTM Standards. Rigid perforated PVC pipe is also permissible provided the minimum wall thickness for 4” pipe is 0.075”, and for 6” pipe is 0.10”, and is installed in accordance with ASTM Standards.
4. Polyethylene or other suitable and previously approved vapor barrier material shall be placed under all concrete slabs including cellar and/or crawl space floors and on grade. Polyethylene under slabs and in crawl spaces shall be at least six (6) mils thick and shall have all joints lapped a minimum of six inches and sealed with mastic or tape. All pipe penetrations shall have the polyethylene taped around them in a secure fashion to prevent moisture infiltration.
5. Liquid asphalt and/or gravel roads and/or drives shall not be considered to be acceptable within the project bounds. Such surfaces, if acceptable by town standards, may be considered up to the project bounds.
6. Erosion during and after construction shall be controlled in accordance with the “Standards and Specifications” published in the “Environmental Quality Handbook” by the Maine Soil and Water Conservation Commission.
7. Footings shall be constructed on undisturbed material unless otherwise specified by the architect. All fill placed under footings must be engineered fill, designed, tested and certified by a Professional Engineer, registered in the State of Maine.
8. Foundation drains shall be provided for all foundation types including frost wall designs. These drains shall be provided both inside and outside of all walls unless soil and/or site conditions can adequately justify alternative designs. Soils Engineers’ reports must be provided as part of any requests for alternatives. These drains must connect to a permanent and positive storm drainage system or daylight to a properly designed surface drainage system. All daylight drains must have their outlooks screened and protected from erosion and entrance of rodents.



9. Floor drains and/or sump holes shall be provided in all basements. The floor shall be pitched to these drains or sumps and these shall be connected to a positive drainage system, exterior of the building.
10. Passive under slab radon venting systems shall be provided beneath all slabs. Active systems may be required if radon testing confirms the need for such added capacity.
11. Compaction tests shall be made by an independent testing agency approved by the architect, at the Contractor's expense in accordance with a schedule approved by the architect, for all fill placed to support the building foundations and for all fill under slabs.
12. Drainage lines shall be sized and pitched to provide velocities of at least 2.5 feet per second in storm drainage lines, and 2.25 feet per second in sanitary lines.
13. Parking spaces shall be permanently delineated upon the pavement. Accessible parking areas shall be so marked and signed.
14. Wheel stops may be provided for parking stalls based on topography, drainage, pedestrian separation, protection of improvements, etc. These may be pre-cast concrete stops or materials of similar size and mass acceptable to the Maine State Housing Authority. Standard asphalt curbing if used as a wheel stop shall be backed up with full depth earth fill.
15. Paved areas within the subject property that are deemed in need of new bituminous concrete paving will be required to follow the standards listed below:
  - A. Prior to the laying of the new bituminous concrete paving(pavement) the existing paving will be required to be removed completely. All exposed gravel base material shall be inspected for contamination by silts or other foreign, deleterious material. Any contaminated base will be required to be removed down to clean, sound material. The use of a Geotextile fabric is strongly recommended in heavy traffic areas that have a history of pavement failure. The removed material shall be replaced with aggregate base material as per M.D.O.T. Sec. 703.06 Type A. All new material shall be evenly spread in lifts not to exceed eight (8") inches in depth and compacted in place to a minimum of 95% of the maximum density as per ASTM D1557. The minimum total base thickness shall be as follows: 18" for Roadways and Parking Areas; 12" for Walkways and Ramps.
  - B. If specified, the gravel base shall receive a treatment of Liquid Calcium Chloride. The Liquid Calcium Chloride shall be in strict conformance with Calcium Chloride Institute Manual SM-1, 1959. The base shall be treated with 0.75 gallons/square yard liquid calcium chloride before compaction of the granular base material. After compaction, 0.25 gallons/square yard liquid calcium chloride shall be applied.
  - C. The minimum compacted thickness and mix design for the pavement courses shall be as follows: Binder Course – 19 mm superpave mix as defined by DOT; Surface Course - 9.5 mm superpave as defined by DOT.
  - D. Where new pavement matches to existing care shall be taken to insure proper binding of the two materials. Utilize an asphalt binding paint as required. Existing and new surfaces shall meet in a smooth continuous plane free from variations in height or smoothness. Clean and treat all areas thoroughly prior to installation.
  - E. The temperature of the pavement mix shall be regulated to ensure that at the time of spreading the mix is between 250-degrees F and 300-degrees F.

Pavement having temperatures outside of the specified temperature range when dumped into the spreader will be rejected.

- F. The mixture will need to be thoroughly compacted by rolling. Rolling to begin as soon as the placement of the mixture will bear the roller without undue displacement. Delays in rolling freshly spread mixture will not be acceptable.
- G. The construction of the new pavement shall be carried on only when the surface on which the mix is to be placed is dry, and when the surface temperature of the underlying course is greater than 45 degrees F for course thickness' greater than one-inch and 55 degrees F for course thickness' one-inch or less. Do not place pavement after sunset or before sunrise.
- H. It shall be the Contractor's responsibility to prohibit vehicular traffic, including heavy equipment, from traveling upon the pavement until the surface temperature has cooled to 120-degrees F. Surface temperatures shall be measured by approved surface thermometers or equal.

### Division 3. Concrete

- 1. Foundation design shall be consistent with the findings and recommendations of the geotechnical engineer.
- 2. Cast in place concrete shall achieve the following minimum 28 day compressive strengths: Footings – 3,000 PSI; Foundation walls – 3,500 PSI; Interior flatwork – 3,000 PSI; Exterior flatwork – 3,500 PSI with 5-7% air entrainment.
- 3. Admixtures proposed for use in concrete shall be used in accordance with the American Concrete Institute with the exception of calcium chloride. This material is undesirable due to the side effects and conditions it creates within the concrete. Accelerating admixtures are to be used in place of calcium chloride. The accelerator used must be a national brand which has been performance tested
- 4. Polyethylene or other suitable and previously approved vapor barrier material shall be placed under all concrete slabs including cellar and/or crawl space floors and on grade. Polyethylene under slabs and in crawl spaces shall be at least six (6) mils thick and shall have all joints lapped a minimum of six inches and sealed with mastic or tape. All pipe penetrations shall have the polyethylene taped around them in a secure fashion to prevent moisture infiltration.
- 5. Footings shall be constructed on undisturbed material unless otherwise specified by the architect. All fill placed under footings must be engineered fill, designed, tested and certified by a Professional Engineer, registered in the State of Maine.
- 6. Footings shall be separated from foundation walls with a sufficient barrier to prevent water wicking.
- 7. Floor drains and/or sump holes shall be provided in all basements. The floor shall be pitched to these drains or sumps and these shall be connected to a positive drainage system, and discharge exterior of the building.
- 8. Concrete foundations for wood frame structures shall be reinforced with at least two number four bars in the bottom of the wall or footing and two in the top of the wall. All corner reinforcing shall be pre-formed, lapped and securely tied to the main reinforcing bars.
- 9. The owner shall retain a qualified testing agency to monitor and test all critical structural concrete. Concrete placement records shall be provided by the contractor to the Maine State Housing Authority of all slump and strength tests required in accordance with ACI documents. At a minimum there should be one strength test for each 50 cubic yds. Or fraction thereof of material place in any one day. Three (3)

test cylinders constitute one strength test; one cylinder is tested at 7 days for information only; 2 cylinders are tested at 28 days to determine acceptance. It is recommended that a fourth cylinder be cast in case a 56 day test is necessary.

#### Division 4, Masonry

1. All masonry ties and anchors for veneer walls shall be stainless steel.
2. Particular attention shall be paid to maintaining cavity walls free from mortar during construction. Appropriate methods and means to achieve this requirement shall be agreed to prior to masonry installation.
3. Particular attention shall be paid to the detailing and installation of through wall flashings and weep systems for cavity wall construction. All such items shall be properly detailed and/or specified on the construction documents.

#### Division 5, Steel & Metals

1. Particular attention shall be paid to the detailing of structural steel elements that may penetrate the thermal envelopes. Efforts should be made to avoid thermal "short circuits."
2. All structural element field welding shall be third party inspected and/or tested and appropriate documentation provided to assure quality of welds consistent with the construction documents requirements.

#### Division 6, Carpentry

1. Pressure treated lumber shall meet manufacturers requirements for installation location, e.g.: Framing in contact with concrete or masonry – 0.40#/cubic foot; Posts embedded in soil 0.60#/cubic foot. Fasteners and hangers to be hot dipped galvanized. Flashings to be isolated from PT lumber.
2. Drywall or other hard ceiling finishes in buildings with the bottom chords of roof trusses or floor framing spaced at 24" on center shall be installed on strapping spaced at 16" on center.
3. Wood foundations shall not be permitted without the express approval of the Maine State Housing Authority and may be granted only when all other proven methods of foundation construction have been eliminated, and/or when MSHA determines for a particular installation that wood foundations constitute a substantial advantage over other materials. The system must be listed and certified by a national listing service.
4. Trim of composition or particle board, with or without plastic coating, is not permitted.
5. New stairs serving more than one dwelling unit shall provide a minimum clear width of 44" unless otherwise required by code.
6. Provide underlayment grade plywood at all areas scheduled to receive sheet vinyl or VCT.
7. Residential Kitchen Cabinets shall be of all plywood box construction and all drawer fronts, cabinet faces, styles, and rails shall be constructed of hardwood. The use of melamine is prohibited.

#### Division 7, Thermal and Moisture Protection

1. The building thermal envelope shall meet the requirements of the Maine State Energy code. Minimum thermal resistance requirements ("R" factors) for walls shall be R-19 and for ceilings R-38. All penetrations in the building envelope shall be

- properly air-sealed. SEE MSHA'S GREEN BUILDING STANDARDS FOR FURTHER REQUIREMENTS.
2. Polyurethane foam and/or other combustible insulations shall not be permitted except when enclosed within a structural assembly which will protect it from sources of fire, and prevent the propagation of flame and the provision of air.
  3. Polyethylene (minimum 6 mils thick) vapor barriers shall be placed on the interior surfaces of all wall and ceiling framing separating heated spaces. All joints and penetrations shall be properly sealed to prevent moisture migration.
  4. Blown-in loose insulation products may be used in accessible attic areas.
  5. Specialty insulation products such as spray foams shall be presented to and reviewed by the MSHA Construction Services staff for approval prior to use in any project.
  6. R-5 closed cell rigid insulation is required beneath the entire floor slab area.
  7. The use of cellulose insulation may be considered on a case by case basis for use in accessible attic spaces and /or wall systems.
  8. Aluminum and T-111 Wood sheeting shall not be permitted as siding materials on any dwellings.
  9. Vinyl siding and trim shall be a minimum of .044" thickness and simulate standard wood sidings as to exposure, shadow lines, depths, etc.
  10. White cedar shingles may be used as an exterior finish alternative in any development subject to the material complying with "Clear Grade" as defined in MRSA\* T.30, C.226 and 3704.2, Standards for Maine Cedar Shingles and with the definitions of "Black Knot", "Defects", "Rot and Decay", and "Sapwood", provided in that statute. Maximum coursing shall be 5" T.T.W. Minimum side lap of 1" in adjacent courses. Avoid vertical alignment in alternate courses
  11. The minimum standard of quality for roofing shingles is a 30-year warranty organic asphalt or fiberglass. Heavier grade, "Architectural" shingles are strongly recommended.
  12. EPDM roofing - Standard of quality is Firestone fully adhered (0.060) system, with a minimum 15 year Full System Warranty.
  13. Flashing and Sheet Metal – Roof drip edge shall be 0.032" min aluminum (no galvanized).
  14. Attic ventilation shall be sized based on 1/150 of floor area. (The BOCA exception for ceiling vapor retarder is not recognized by MSHA). Ventilation calculation shall be shown on drawings.
  15. The use of "Ice & Watershield" by W.R. Grace Co. is required for all drip edge (minimum 6' up the roof), rake (minimum 3' in from roof edge), and valley underlayments beneath shingles (minimum of 3' up each side of valley).
  16. Other roofing products, including metal roof systems, will be considered on a case by case basis.

#### Division 8, Doors and Windows

1. Windows – Minimum standard of quality is CertainTeed "New Castle." SEE MSHA'S GREEN BUILDING STANDARDS FOR FURTHER REQUIREMENTS.
2. The use of hinge pin doorstops is prohibited.
3. The use of aluminum windows is strongly discouraged.
4. Metal frames for doors and windows will not be permitted without thermal breaks between interior and exterior surfaces which prevent any parts exposed to the interior air from reaching temperatures which would cause condensation.

- Manufacturer's certification of the effectiveness of the thermal breaks shall be furnished to the Maine State Housing Authority before approval for installation of such windows will be granted.
5. Screens shall be provided for all operable windows.
  6. Storm and screen doors if provided shall be of sufficient strength to withstand hard use, and shall be equipped with closers which will prevent the springing of the door from wind and hard use. Storm doors shall be provided for all dwelling exterior hinged doors which have a coefficient of thermal transmission (U factor) lower than 0.45 BTU/hour/square foot/degree F. or as may be directed by the Maine State Housing Authority.
  7. The use of sliding glass doors for exterior access is prohibited.

#### Division 9, Finishes

1. Drywall used for walls or ceilings shall have a minimum nominal thickness of 1/2". If used with supporting members spaced more than 16" on centers, minimum drywall thickness shall be 5/8". Metal casing bead shall be used whenever gypsum board butts up against a dissimilar material wherever covering trim will not be used. All gypsum board used on walls and ceilings as a finish material shall be fastened with drywall screws in accordance with manufacturer's instructions.
2. Plywood Paneling used as an interior finish and less than 3/8" nominal thickness shall be placed over an approved substrate such as gypsum board.
3. Ceiling finishes other than standard paint on taped and patched drywall shall be approved by the Maine State Housing Authority as being easily patched in an indiscernible manner. A sample shall be prepared by the contractor and submitted to the Maine State Housing Authority for approval before installation of the finish.
4. Paint used on interior walls shall be no less resistant to wear and washing than a satin finish, alkyl base paint, and on trim and wood-work than a stain finish enamel. Semi-gloss latex paint for dry wall surfaces will be acceptable. SEE MSHA'S GREEN BUILDING STANDARDS FOR FURTHER REQUIREMENTS.
5. Vinyl wall covering if provided shall have a minimum weight of sixteen (16) ounces per square yard which is the equivalent of twenty-four (24) ounces per linear yard of fifty-four (54) inch wide material.
6. Floor areas designated for carpeting shall be covered with material meeting following specifications:
  - A. Construction: Tufted level loop or textured loop. Continuous filament nylon with anti-microbial processing, permanent static control, 3.0 K.V. meeting test method AATCC 134-1969.
  - B. Dye Method: 1<sup>st</sup> Choice: 100% solution dyed; 2<sup>nd</sup> Choice: At least 70% solution dyed, remaining to be yarn dyed.
  - C. Gauge: Minimum 1/8.
  - D. Stitches per inch: Minimum 9.
  - E. Face Weight: Minimum 28 oz.
  - F. Pile Height: 3/16 inch minimum.
  - G. Primary Backing: 100% Polypropylene.
  - H. Secondary Backing: Action back or unitary back with 20 lb. Tuft lock if floors are rough, contain moisture, or are exposed to concentrated same directional traffic.
  - I. Maine State Housing Authority would prefer solution-dyed 28-ounce (or heavier) graphic nylon loop carpet for use in waiting areas.

- J. All carpet must meet UM44d. SEE MSHA'S GREEN BUILDING STANDARDS FOR FURTHER REQUIREMENTS.

#### Division 10, Specialties

1. Room darkening shades or blinds shall be provided for all bedroom windows. Shades shall be sufficiently opaque to darken the room when drawn closed. Pull down shades with cardboard rollers are prohibited.
2. Curtain rods shall be installed above all windows. Equipment and installation shall be strong enough to withstand hard use.
3. One inch diameter grab bars are recommended in lieu of standard towel bars.

#### Division 11, Equipment

1. Ranges and/or cooktop surfaces shall not be located adjacent to a vertical wall surfaces.
2. SEE MSHA'S GREEN BUILDING STANDARDS FOR FURTHER REQUIREMENTS.

#### Division 13, Fire protection

1. Sprinkler systems are recommended for all projects.
2. Water and/or sprinkler lines shall not be run in unheated attic spaces, outside wall cavities, unheated crawl spaces or any other areas subject to freezing temperatures. Use of anti freeze loops or dry pipe systems for sprinkler lines in such areas are acceptable alternatives but shall be engineered for such use.
3. Tamper proof switches shall be provided for all sprinkler valves.

#### Division 14, Elevators

1. For multistory projects serving frail elderly, an emergency generator sized to handle electrical requirements of the elevator is strongly recommended.

#### Division 15, Mechanical Systems

1. Provide a main water supply shutoff for each building.
2. All domestic above grade water supply piping shall be type "L" copper.
3. All domestic below grade interior water supply piping shall be type "K" copper.
4. All above grade heat system piping shall be type "L" copper.
5. All below grade interior heat system piping shall be type "K" copper.
6. Thermostats in dwelling units should be Honeywell T-87 or approved equal. For projects serving seniors, the Honeywell T-87 with the EZ view option or approved equal is strongly recommended.
7. The use of "PEX" tubing for heat piping shall be reviewed on a case by case basis.
8. The use of "Power Vents" for combustion exhaust on heating appliances is prohibited.
9. Combustion and ventilation air is required in all mechanical rooms housing fuel burning appliances.
10. Tankless coils for DHW generation shall be sized to produce adequate DHW for the projected worst case unit needs.
11. For larger facilities two boilers each sized to meet 75% of heating load are recommended.
12. Electric resistance heat is prohibited.

13. All hot water heaters in Elderly Projects shall be adjusted so that the maximum hot water temperature will be 125 degree F. at the fixtures.
14. Floor drains and/or sump holes shall be provided in all basements. The floor shall be pitched to these drains or sumps and these shall be connected to a positive drainage system, or to the exterior of the building.
15. Plumbing traps shall be located so as to be accessible. Access panels shall be constructed in accordance with the Maine State Plumbing Code, and be properly firestopped should they occur in fire rated assemblies.
16. Water heater drains from pressure-temperature relief valves shall not discharge on living unit floors. Pressure-temperature relief valve piping shall be securely mounted.
17. Heat loss calculations shall be based on an outside design temperature as determined by the ASHRAE Handbook of Fundamentals at the 99% design value for a particular geographic area. Elderly units must be certified as having the capacity to maintain a temperature of 75 degrees F. and family units must be certified as having the capacity to maintain a temperature of 70 degrees F. at the specified outside design temperature.
18. Water shall not be run in unheated attic spaces, outside wall cavities, unheated crawl spaces or any other areas subject to freezing temperatures. Water conservation shall be considered in all designs. SEE MSHA'S GREEN BUILDING STANDARDS FOR FURTHER REQUIREMENTS.
19. The Mechanical subcontractor shall be responsible for maintaining the entire heating system in good working order for at least one year from the date of substantial completion of the entire project.
20. It is recommended that bathrooms with outside walls be fitted with supplemental heat within such rooms.
21. Fixtures and/or devices containing mercury should be avoided.

#### Division 16, Electrical Systems

1. Products of combustion detectors (smoke detectors) shall provide BOTH audible and visual alarms.
2. Unit electrical panels in accessible and adaptable units shall be mounted consistent with reach requirements for wheelchair users. Electric panels should be located behind master bedroom door. Electric panels shall not be located in closets. Electric panels shall not be located back to back in common walls.
3. Electric resistance heat is prohibited.
4. Smoke detectors shall be powered off a circuit that includes essential lights and/or devices.
5. For projects serving frail elderly, an emergency generator sized to handle electrical requirements of the elevator, heat, and life safety systems is strongly recommended.
6. All circuits shall be 20 amp minimum (The use of #14 wire is prohibited).
7. Incandescent lamps are generally prohibited. Wherever possible, provide compact fluorescent fixtures/lamps. SEE ALSO MSHA'S GREEN BUILDING STANDARDS FOR FURTHER REQUIREMENTS.
8. Generally, recessed "can" type lighting fixtures in the ceiling of top story are prohibited (Intent: maintain integrity of thermal envelope). SEE ALSO MSHA'S GREEN BUILDING STANDARDS FOR FURTHER REQUIREMENTS.
9. Pre-wiring for connection to internet providers is required.

10. Emergency call systems including pull stations and unit door electric door strikes shall be considered as appropriate for the proposed users, specifically the elderly, frail, and/or disabled.
11. Recessed device wiring boxes are to be staggered in common walls per codes.
12. Fixtures and/or devices containing mercury should be avoided.

**END OF PART 1**



## PART 2

### DESIGN AND CONSTRUCTION DOCUMENTS

#### A. INTRODUCTION

Design and construction documents shall be submitted to the Maine State Housing Authority at four points during their development for review and approval by the Maine State Housing Authority. The formal submissions are defined below and include Concept, Design Development, and Construction Documents (90% Completion and 100% Completion). All documents shall be prepared by or under the direction of an architect registered in the State of Maine, stamped with the design professional's registration seal, and accompanied by the statement signed by the professional certifying compliance with the Maine State Housing Authority's standards. Each submission shall be prepared in accordance with the requirements of this Design & Construction Manual and shall be approved by the Maine State Housing Authority before submission of the next. The Maine State Housing Authority shall not review any submittals which are not complete in accordance with the following:

#### B. CONCEPT SUBMISSION - 1 COPY FOR MSHA

The design of a project begins after the selection of a proposed application by the Authority. The mechanism utilized to initiate the design process is through a concept meeting and is described herein.

A joint meeting between Applicant, Architect, and MSHA is held, at which time preliminary design as well as other facets of the program are discussed. Preliminary design discussions relate to form, type, and number of buildings, and proposed unit mix that will comprise the project and the respective siting of these buildings, which in turn requires soil and survey information for meaningful decision making. Therefore, the Authority requires that a soil survey, and a topographical and boundary survey be completed and be provided at concept design.

A SOIL SURVEY SHALL be made of all sites for new construction, and may be required on sites for substantial rehabilitation. A soil survey shall be of high intensity performed by a soil scientist registered by the State of Maine, and reported on in accordance with the standards and nomenclature of the National Comprehensive Soil Survey,

It is at the discretion of the Authority to accept soil surveys provided by a certified engineer. Additional information may be required where circumstances merit and in particular all filled sites will require several borings under each building to determine both bearing capacity and composition of the various strata of fill.

1. TOPOGRAPHICAL AND BOUNDARY SURVEY (For rehabilitation of existing buildings, MSHA may waive in writing the requirement of the topographical information) at a scale not less than forty (40) feet to the inch, dated currently, (within 1 year from date of submittal) prepared, stamped, and certified by a registered surveyor or engineer (see the Maine State Housing Authority Real Property Survey Certification in the Appendix), made by field verification in the U.S. Standard of Measurement, and shall show the following:

- A. BOUNDARY LINES giving length and bearing on each straight line, radius, point of tangency, and length of curved lines. Set iron pin at property corners where none exists; drive pin 18" into ground, mark with wood stake; state on drawing whether corners were found or set and describe each.
- B. NORTH ARROW with True and Magnetic north points.
- C. DESCRIPTION OF MEASUREMENTS in recorded deeds for comparison with observed.
- D. AREA in square feet if less than one acre, in acres if over one acre.
- E. IDENTIFY JURISDICTION and width of adjoining street and highways, width and how paved, identity of landmarks.
- F. PLOTTED LOCATION and height of structures within 100 feet of the property as well as those on the property. Vacant parcels shall be noted VACANT.
- G. FENCES AND WALLS describe type and conditions. Identify party walls and locate with respect to property lines.
- H. EASEMENTS AND RIGHTS-OF-WAY recorded or otherwise known, state owner of right and recording information, if any.
- I. POSSIBILITIES of prescriptive rights-of-way and nature of each.
- J. INDIVIDUAL LOT LINES and lot and block numbers and street number of buildings.
- K. NAMES OF OWNERS of adjacent property and recording information. Also show approximate location of boundaries separating abutter's properties contiguous to project property.
- L. RECONCILIATION or explanation of discrepancies between survey and recorded legal description.
- M. IDENTIFICATION OF DATUM on or near site and elevation to nearest .01' if USHS datum is not utilized.
- N. CONTOURS at 2 foot intervals (errors shall not exceed one-half contour interval) of the property and of adjacent roads and of adjacent areas which either conduct concentrated drainage onto the site, or receive concentrated drainage from the site in sufficient area to determine its effects on site drainage.
- O. PLOTTED LOCATION OF STRUCTURES man made and natural features; such as wetlands or rock outcropping.
- P. WATER AND GAS MAIN locations, sizes, depths and pressure, and any other utilities serving or on the property. NOTE: It is expected that field verification and/or physical inspection of key underground elements will be provided.
- Q. FIRE HYDRANT LOCATIONS available to property and size of main serving each.
- R. ELECTRICITY AND TELEPHONE poles and lines located. NOTE: It is expected that field verification and/or physical inspection of key underground elements will be provided.
- S. SEWER location, size, depth and direction of flow of sanitary sewers, combination sewers, storm drains, and culverts which are on the property or which serve it; location of catch-basins and manholes and inlet and outlet and rim elevations and inverts of pipes at each. NOTE: It is expected that field verification and/or physical inspection of key underground elements will be provided.

- T. MEAN ELEVATION OF WATER in any excavation, well, or nearby body; flood level of streams or freshets overrunning the site.
  - U. TEST BORING locations, if any taken.
  - V. TREE LOCATIONS of all trees that are 8" caliper and over and are 3' above ground and identify species and size except trees within a thickly wooded area.
  - W. PERIMETER outline of treed areas only if thickly wooded areas.
  - X. TAX LOT AND TAX BLOCK NUMBERS or note that none have been established by municipality.
2. LEGAL DESCRIPTION A written legal description of the deed shall be provided which accurately reflects the data as provided on the topographical and boundary survey.
3. DIAGRAMATIC SITE PLAN required at a scale not less than forty (40) feet to the inch showing the general development of the site and include:
- A. location of streets
  - B. parking and driveways
  - C. in retrofit construction – location of existing and adjacent buildings
  - D. in new construction existing and proposed buildings
  - E. passive and active recreation areas
  - F. intention of dedication of streets where applicable
  - G. property lines must be shown for all streets and rights-of-way.
4. FLOOR PLANS for new construction must show diagrammatically the orientation of areas for daytime use, the principle entrances to structures, and the way the living units relate to the exterior to provide an arrangement which achieves privacy and a sense of home for the inhabitants. These considerations must be made in an attempt to provide passive solar heat to the interior space, especially those areas designated for day time use.
5. FLOOR PLANS FOR THE REHABILITATION OF AN EXISTING BUILDING must be submitted for the building as it exists and as proposed. A plan for each floor or typical floors must be submitted at a scale not less than eight feet to the inch. When possible one set of plans can be submitted showing existing walls, partitions, columns, doors, windows, stairs and plumbing (unless the building is to be gutted, in which case indicating only the major structural systems) and showing proposed modifications to the layout of the existing building to indicate rooms, entrances, stairs, halls, storage and common areas. Differentiation shall be made between existing to remain, existing to be removed, and new construction.
6. BUILDING ELEVATIONS drawn to convenient scale indicating the design intent for the primary façade(s). Label typical finish materials; indicate entries, and general glazing patterns and sizes.
7. ARCHITECT'S CERTIFICATION (See Appendix)

*Agreement must be reached by the Applicant and MSHA on the general form the project will take before permission will be granted to proceed to the Design Development Phase.*

### **C. DESIGN DEVELOPMENT SUBMISSION - 1 COPY FOR MSHA**

The Design Development Submission is expected to present approximately 50% of the Construction Documents level of information and shall formalize the site plan, building configuration, and internal layout of the living units in sufficient detail to allow preparation of a budget for construction without proceeding to the preparation of the final construction drawings. MSHA will review this submission for conformance to the previously referenced standards relating to general layout of site, buildings, and living units, room size and shape, special provisions of plan layout for accessibility requirements, fire separation and the provision of adequate means of egress, and removal of solid waste.

The Maine State Housing Authority may waive in writing, the requirement of some of the information or may require in writing, additional information. Design Development Submissions will not be reviewed or processed by the Maine State Housing Authority until we are in receipt of approved Pre-Concept and Concept drawings which include the Soil Survey, Boundary and Topographic information as previously described.

1. SOILS ENGINEER'S REPORT, shall be submitted for all new construction developments specified by the Maine State Housing Authority. This report shall include recommendations for foundation design and site drainage in accordance with soil survey information previously obtained. (In many instances the developer may choose to do both portions of the soil study at one time. If this is done, the report should be provided at Concept and re-submitted at with the Design Development Submission.)
2. PLOT PLAN, drawn to a scale no less than forty (40) feet to the inch, showing the general development of the site with locations of buildings, walks, streets, parking spaces, driveways, service areas, including solid waste collection areas, recreation and private outdoor spaces. Topography shall be shown at two (2) foot intervals, indicating both existing (dotted lines) and finish (solid lines) grades where changed. First floor elevation shall be noted on each building, utilities shall be shown, including underground power feeds, transformer locations, water and sewer mains, hydrants, storm drains, catch basins and outfalls. Streets intended for dedication and public acceptance shall be delineated and accessible units, accessible parking, and means of access shall be indicated. Preservation of existing growth and new planting shall be show, identifying form, size and whether deciduous or coniferous, but not necessarily species.
3. BUILDING PLANS, ELEVATIONS AND A TYPICAL SECTION drawn to scale of not less than eight (8) feet to the inch, showing the location of living units, accessible units, common area, entrances, windows, circulation, and relation to site features. Lines of fire and acoustical separation and ratings shall be shown on plans and sections as necessary to demonstrate conformance with the standards.
4. FLOOR PLANS of typical living units drawn to a scale not less than four (4) feet to the inch showing furniture layouts and indicating dimensions of rooms measured as clear distance between walls. Usable storage areas are to be shaded/blocked out/cross-hatched or otherwise delineated with applicable dimensions and volumes also provided on plans.
5. OUTLINE SPECIFICATIONS are to include a brief description of all of the trades, their proposed work scopes, and the major materials that are being considered for each trade.
6. A DESCRIPTION OF MEANS AND FREQUENCY OF SOLID WASTE COLLECTION and removal, including the amount of storage necessary.
7. A DESCRIPTION OF THE TYPE OF SPACE AND WATER HEATING SYSTEMS proposed, including a statement about the use of utility allowance. This must be submitted separately and accompany the drawings.

8. CALCULATIONS AND STATEMENT OF EXPECTED CONSTRUCTION COSTS for the scope of work defined in the documents. Estimates shall be by line item utilizing the CSI format and be of sufficient detail with proper backup to demonstrate an accurate reflection of the materials, equipment, and labor that will be necessary to construct the project.
9. ARCHITECT'S TRANSMITTAL FORM
10. TABULATION OF BUILDING, LIVING UNITS AND ROOM FLOOR AREAS according to the following format:

NOTE: See notes at end of tables for further explanation

UNIT TABULATIONS (Provide a separate sheet for each unit type)

Unit Type \_\_\_\_\_ (as identified on plans – include common areas/laundry/community rooms as separate tabulations)

**SQUARE FOOT TABULATIONS**

Living Room (LR)	_____
Dining Room (DR)	_____
Kitchen (K)	_____
LR-DA	_____
LR-DA-SL	_____
LR-DA-K	_____
LR-SL	_____
K-DA	_____
Primary Bedroom (SL)	_____
Bedroom #2	_____
Bedroom #3	_____
Bedroom #4	_____
<b>Total, habitable rooms (net)</b>	_____

Interior Walls (LF by thickness)	_____
Exterior Walls (LF by thickness)	_____
Portion of Shared Party Walls	_____
Closets	_____
Basement	_____
Laundry/utility	_____
Circulation	_____
Play Space	_____
Storage	_____
<b>Total Dwelling (Gross)</b>	_____

\_\_\_\_\_ cubic ft.  
**sq. ft.**

BUILDING TABULATIONS (Provide a separate sheet for each Building Type)

Building Type \_\_\_\_\_ (as per Plans)

**SQUARE FOOT TABULATIONS**

Total dwellings \_\_\_\_\_

Interior Walls (LF by thickness) \_\_\_\_\_

Exterior Walls (LF by thickness) \_\_\_\_\_

Portion of Party Walls \_\_\_\_\_

Tenant Storage \_\_\_\_\_

Office \_\_\_\_\_

Social Area \_\_\_\_\_

Community laundry \_\_\_\_\_

Community kitchen \_\_\_\_\_

Community bathrooms \_\_\_\_\_

**Subtotal** \_\_\_\_\_

Project Storage \_\_\_\_\_

Project Maintenance \_\_\_\_\_

Circulation \_\_\_\_\_

Other (describe) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Total Building** \_\_\_\_\_

## PROJECT TABULATIONS

Project Name and Location: \_\_\_\_\_

	Regular		Accessible	
Number of 1 B.R. units	_____		_____	
Number of 2 B.R. units	_____		_____	
Number of 3 B.R. units	_____		_____	
Number of 4 B.R. units	_____		_____	
Totals	_____	+	_____	= _____
Square Foot Tabulations				
Total Dwellings	_____			
Tenant Storage	_____			
Office	_____			
Social Area	_____			
Community Laundries	_____			
Community Kitchen	_____			
Community Bathrooms	_____			
Subtotal	_____			
Project Storage	_____			
Project Maintenance	_____			
Circulation	_____			
Other (describe)	_____			
	_____			
	_____			
<b>Total Project</b>	_____			

### NOTES FOR TABLES

1. If a room or space is not included in your design so state in the table as "NA."
2. For interior rooms, provide SF calculations using framing face to face of interior finished surfaces, net dimensions.
3. For building gross SF calculations use outside of foundation wall to outside of foundation wall, gross dimensions.
4. Note that storage is tabulated in square feet and in cubic feet - provide both.
5. Play space in family units without basements is in addition to any storage requirements.
6. Provide Separate Sheets for each different unit type and building type.



## D. CONSTRUCTION DOCUMENTS - 1 COPY FOR MSHA

Working drawings and specifications shall be the contract construction documents which completely describe the design, materials and assembly of the entire development to determine the finished state of work. Formal submittals shall be provided at the 90% completion stage, **and** 100% completion. The term "or equal", alternates of methods, materials or equipment shall not be used; and changes subsequent to the acceptance of final Construction Documents (100% submittal) shall be made by Change Order for review and acceptance by MSHA before incorporation in the work. The Construction Documents Shall include the following:

Drawings shall be of uniform size and be stamped on each sheet by the designer of record. The following general format shall be used:

### 1. COVER SHEET

- A. TITLE OF PROJECT, the Maine State Housing Authority Project Number and Project Location.
- B. INDEX OF DRAWINGS by name, numbered consecutively.
- C. SITE LOCATION MAP
- D. CODE STUDY/ANALYSIS SUMMARY
- E. SIGNATURE BLOCK setting forth space for the following signatures:

	Signature	Date
Architect	_____	_____
Owner	_____	_____
Contractor	_____	_____
MSHA	_____	_____
Construction	_____	_____
Lender	_____	_____

### 2. PLOT OR SITE PLAN

- A. SCALE not less than 1" = 40'
- B. PROPERTY BOUNDARIES and markers
- C. NORTH INDICATION true and magnetic north points
- D. EXISTING PUBLIC AND PRIVATE WAYS adjacent to or within the property boundaries, indicating as applicable legal boundaries, the traveled way, edges of pavements, curbs, walks, wheel stops, and other physical features existing to remain or to be removed, and improvements to them.
- E. NEW STREETS AND DRIVES parking areas, walks, curbs, edges of pavement, wheel stops, and boundaries of any property for dedication and public acceptance.
- F. OTHER PAVED AREAS and constructed site improvements such as play and sitting areas, service courts, drying yards, fences, retaining walls, solid waste collection facilities, outdoor mail boxes.
- G. UTILITIES including water mains and hydrants; electric lines overhead and underground poles, lighting and transformers; telephone lines, cable T.V. lines, MATV lines, sanitary and storm sewers, manholes, and catch basins. Indicate diameters and inverts for storm, sanitary sewers, and foundation drainage systems at building exits, in and out of all manholes, connections, and cross-over points. Also show diameters for water mains. Show utilities to the point of connection with the existing system.

- H. TOPOGRAPHY indicate finish grades by solid lines and existing grades to be changed by dotted lines at two (2) foot intervals if a separate grading and drainage plan is not provided. Existing trees and other natural features, indicating whether to be removed or preserved.
  - I. BUILDING LOCATIONS AND DESIGNATIONS with grade elevations at corners and entrances if not show on a separate grading and drainage plan.
  - J. PROFILES of streets, walks, storm and sanitary sewers.
  - K. DIMENSIONS for locating and over all dimensions of all of the above.
  - L. LAYOUT LINES with dimensions and bearing for all structures and paving.
3. GRADING & DRAINAGE PLAN – Scale minimum 1" = 40'
- When the information listed below cannot be shown clearly on the Site Plan, a Grading and Drainage Plan shall be provided to show the following:
- A. FINISH GRADE ELEVATIONS at all building corners and at entrances.
  - B. FINISH GRADE CONTOURS shall be shown at two (2) foot intervals indicated in solid line where changed, and with exiting contours indicated with dotted line.
  - C. MEANS OF COLLECTING SURFACE DRAINAGE protection of abutting properties and relation to any subsurface system provided.
  - D. FOUNDATION drainage layouts and connections to subsurface systems or outlooks.
  - E. DISTRIBUTION OF PLANT MATERIAL location, quantity and key number of each general species of plant in group, lawn areas, and existing trees, if any, to be preserved or transplanted.
  - F. ENLARGED SCALED PARTIAL PLANS clearly indicating compliance with all accessibility requirements at entries.
4. LANDSCAPE PLAN - Scale not less than the Site Plan (minimum 1" = 40').
- A. OUTLINE OF BUILDINGS and other improvements of the project, together with physical features of the site for the purpose of establishing the location and relationships between planting and other construction.
  - B. DISTRIBUTION OF PLANT MATERIAL; location, quantity, and key number of each general species of plant in group; lawn areas, and existing trees, if any, to be preserved or transplanted.
  - C. LIST OF PLANT MATERIAL giving standardized plant names, key number for each variety in reference to plan, and the size, quality, or other pertinent description.
  - D. OTHER EQUIPMENT such as benches, fences, drying lines, paths, game areas, play equipment, etc.
5. FOUNDATION PLANS - Scale of minimum of 1/8" = 1'
- A. FOOTINGS, step footings, pilings, grade beams, walls, columns, piers, and slabs with dimensions, thicknesses, and locations.
  - B. CONSTRUCTION AND EXPANSION JOINTS bond outs, windows, sumps, electrical, telephone, plumbing, and air duct locations.
  - C. ENLARGED DETAILS of reinforcing, foundation drainage systems, keys, corners, joints, insulation, sub-base, vapor barrier, waterproofing, etc. when not shown clearly at the above scale, or explained in notes.
6. BUILDING LAYOUT PLANS - Scale of minimum of 1/8" = 1'
- Unless fully shown on living unit plans for small buildings, Building Floor Plans of each building shall show the following:

- A. THE DIMENSIONED RELATION of living units and buildings to each other; over-all dimensions of buildings, partition arrangement and fenestration of end living units, units at corners and units at offsets; other partitions as may be necessary only to show variations from the typical living unit plans and relation of rooms in adjacent living units; walls separating living units and their material and thickness.
  - B. ALL BUILDINGS IDENTIFIED by numbers or letters and each living unit identified, including accessible units.
  - C. WALL CONSTRUCTION TYPES AND LEGEND WITH KEYS INDICATING locations required for fire and acoustical separation. Provide adequate cross references as to locations of all wall types and details. Provide design references justifying all fire and sound rated assemblies.
7. LIVING UNIT FLOOR PLANS - Scale of minimum of  $1/4" = 1'$
- A. LIVING UNIT FLOOR PLANS for each type of living unit and variation.
  - B. SEPARATE UNIT PLANS are not required when the general floor plans are provided at the above scale and contain all essential information.
  - C. OVER-ALL DIMENSIONS and dimensions to all partitions, window locations and type designations referring to schedule, dimensioned stair location, runs and widths, landings and handrails.
  - D. CLOSETS, shelving and clothes rods; radiators or other heating devices, chimneys, and all other such items, unless shown on separate plumbing, mechanical and electrical drawings to same scale.
  - E. LOCATION OF STRUCTURAL ELEMENTS such as columns, lintels, joists, beams,
  - F. girders, and bearing partitions. Show sizes, spacing and direction of members. Submit separate structural drawings where structural information cannot be shown clearly.
  - G. ALL CONDITIONS where units are to join other units, including and unit conditions
  - H. LIVING UNIT TYPES identified by a number or letter.
8. ROOF PLANS - Scale of minimum of  $1/8" = 1'$
- A. RELATION of intersection of the various building roofs; direction of slopes on roofs; parapets, chimneys, vents, and other projections above roofs; downspout location and sizes, flashing and underlayment details.
  - B. Provide free air ventilation calculation demonstrating compliance with standards.
9. BUILDING ELEVATIONS - Scale of minimum of  $1/8" = 1'$
- A. ALL FACES of each typical building showing materials, window and exterior door types related to schedules.
  - B. FLOOR LINES and elevations, exterior grades.
  - C. FLASHING locations, widths, and exposure dimensions
10. PARTIAL ELEVATIONS - Scale of minimum of  $1/4" = 1'$
- Partial elevations may be omitted when Building Elevations have been drawn to the above scale to include information required of partial elevations.
- A. Portions of each type of façade showing the exterior design, including materials, jointing, flashing, special features, windows, doorways, cornices, parapets and all details.
11. BUILDING SECTIONS - Scale of minimum of  $1/4" = 1'$
- A. Cross sectional characteristics of the building and floor level relations at one or more points as necessary to show typical configurations.

12. CONSTRUCTION SECTIONS - Scale of minimum of 1/2" = 1'

- A. EXTERIOR WALL SECTIONS from footing to roof to show each type. Complete construction of: walls with thickness at various stories; floors; furring; waterproofing; ceilings; roofs; including pitch and material; window heads and sills; window heights; flashings; room heights; anchorage and bearings; cornice and gutter; insulations; vapor barrier, foundation walls and footings; footing drains; radon systems; conditions at various depth basements, basement floors or crawl space; roof space, and attic vents.
- B. BEARING WALL OR PARTITION SECTIONS for all types of walls and partitions with floor, ceiling and roof construction; supporting walls or members, columns and girders; foundations and footing; size and spacing of all members' joists, splices or ties; sub and finished floors; walls and ceilings. Provide adequate cross-references to plans for locations of all wall types. Provide design references for all required fire and sound rated assemblies.

13. DETAILS - Scale of minimum of 1/2" = 1'

- A. STAIRS with plans and sections showing stringers, treads, risers, newels, balusters, handrails, rise, run and headroom; show all dimensions.
- B. KITCHEN LAYOUTS with plans and elevations showing accessories, cabinets, location of heaters and ductwork runs. Note accessibility requirements where applicable.
- C. PLAN OF BATHROOM LAYOUTS with elevations showing accessories, radiator or heater, cabinets and fixtures.
- D. SPECIAL EXTERIOR AND INTERIOR DETAILS such as bay windows, dormers, cupolas, vents, built-in furniture, closet sections, blocking for grab bars, range hoods, wood trim details, sheet rock details if returned at windows and doors.

14. SCHEDULES

Shown on any drawing convenient for reference.

- A. DOOR SCHEDULE: size, thickness, materials, and design of each door, with designation on plans. All fire doors shall be indicated with their approved rating.
- B. WINDOW SCHEDULE: Size, thickness, glazing, material and design of each window, with designation on plan elevation. Identify egress windows.
- C. FINISH SCHEDULE: Material and type of finish of floors, walls, ceilings and trim for all rooms. Flame spread and smoke generation ratings for all surfaces required to be limited.
- D. HARDWARE SCHEDULE: Material and type of hardware for each door in door schedule. Include special hardware such as closets, electric door strikes intercom devices, and panic hardware.

15. STRUCTURAL

- A. Structural drawings shall include a framing plan for each floor and roof of each structure not identical to other structures in the project.
  - 1. REPETITIVE FRAMING plans for the floors of structures with more than one story may be combined on one (1) drawing, provided that variations are minor and are clearly identified.
  - 2. FRAMING PLANS shall identify the material, size, location and orientation of all structural members, bracing and bridging, and the structural materials acting as the surfaces of the floors and roof.

3. THE CONNECTIONS of the walls and floor to the foundation shall be detailed.
  4. STRUCTURAL FRAMING around all openings, including those for mechanical ducts, shall be shown, as well as that supporting mechanical equipment.
- B. Trusses shall be detailed as a performance truss meeting all stated live and dead load requirements as set forth by the design professional substantiated by shop drawings and computations from the manufacturer and approved by the design professional prior to installation. The manufacturer's drawings shall be signed and sealed by a professional engineer, registered in the State of Maine. The drawings shall show:
1. THE CONNECTION at each joint shall clearly be shown and the connecting device or method specifically identified.
  2. CONNECTORS shall be located by dimensions from the sides and ends of the members connected.
  3. STRUCTURAL ADHESIVES used in connections shall be specifically identified and the standard applicable to their use referenced on the structural drawings.
  4. THE ANALYSIS of trusses shall take full account of their method of support. Line stress diagrams are acceptable.
  5. LATERAL AND WIND BRACING details as well as handling details
  6. WHERE THE LOADS occurring between panel points induce bending significantly affecting the member stresses, such effects shall be included.
  7. ADEQUATE HOLD DOWN for uplift due to wind and overhang conditions.
- C. With the exception of simple connections, such as the typical end nailing of studs to top and bottom plates which can be covered by notes, all connections shall be detailed. Notching of trusses will not be allowed.

## 16. MECHANICAL

The following information shall be shown on separate drawings at an appropriate scale. If the information can provide clear indication of all details, the preferred scale is that used in earlier drawings for the basement and floor layout (1/8" = 1') in order to allow overlay.

### A. HEATING AND VENTILATION DESIGN

1. LOCATIONS OF EQUIPMENT: Drawings shall show, with dimensions, the location, size, and clearance for all equipment and fixed appliances, e.g., fans, warm air furnaces, boilers, absorption units, etc.
2. EQUIPMENT SCHEDULES: The drawings shall show a tabulation of all equipment and fixed appliance used, showing the listing, the manufacturer's name, make, model number, BTU/hr, and input rating for all energy inputs.
3. STATEMENT OF INTENT: The following paragraph shall appear in the Contract Heating Specifications and should appear on the Drawings pertaining to Heating Systems:

"It is the intent of the drawings and specifications to provide for the installation of a heating system which is safe, quiet, and economical in operation and complete in all respects. This system will provide a uniform temperature of 70 degrees F. (75 degrees F for elderly) in all living spaces as may be noted on the drawings, when the outside temperature is \_\_\_degrees F. (the appropriate outdoor design temperature for each development location shall be specified in accordance with the ASHRAE 99% scale.) All materials

and equipment necessary to accomplish the intent shall be furnished and installed by the contractor.”

4. MECHANICAL VENTILATION SYSTEMS shall be provided with layouts and sizes for all equipment, ductwork, insulation, controls, etc. to describe each total system. Show all parts of systems that are to be thermally insulated.

B. PLUMBING AND SPRINKLER DESIGN

1. Plans and/or schematic drawings of the plumbing layouts, including but not limited to sizes of piping, fittings, traps, and vents, cleanouts and valves, gas, sprinklers, water, and drainage systems shall be provided.
2. Horizontal and vertical sewer and drainage system drawings shall include riser diagrams of typical stacks. These diagrams shall show pipe, vents, and trap sizes, cleanouts fixtures, interceptors and floor drains. Connection and installation details between pipes, fixtures, and appliances shall be provided. Drawings shall show proper slope of waste and vent lines and shall clearly define how such lines penetrate walls and floors without destroying the structural and/or fire safety integrity of such systems.
3. Hot and cold water supply drawings shall include all supply pipe sizes, shut-off valves and descriptions of fixtures supplied, along with a statement as to the supply water-pressure used for the design. Note: All fixtures are required to have shut-off valves for both hot and cold water supply and are also required to be connected by threaded unions. Provide hot and cold main water supply shut-offs for each living unit.
4. All plumbing materials shall be shown either on the drawings, on schedules, or in the specifications with applicable cross-reference provided for clarity. All fixtures shall be located on appropriate drawings with fixture unit capacity of system (s) and make, model and rating/capacity of all equipment and appliances shall be indicated and installed in accordance with these requirements and the manufacturer’s instructions.
5. Where not covered in other drawing, i.e., mechanical or electrical, details, make and model of safety controls (such as for water heaters), their location and listings or labelings, shall be provided.
6. Drawings shall indicate details of pipe and fixture supports (i.e., type and spacing) and indicate pipe protection such as wrapping, sealing and insulating and provide for thermal expansion as applicable.
7. Where not provided by other details, locations of vents above roofs and required clearances for air intakes, windows, other flues and vents, shall be provided.
8. Sprinkler designs shall at least indicate the main feeds and distribution, understanding that the final designs will need to be provided by qualified subcontractors of the trade and be approved by the State Fire Marshal’s Office prior to their installation. Full coordination of the various mechanical systems is necessary prior to installation.

17. ELECTRICAL DESIGN

- A. LOAD CALCULATIONS: Provide branch circuit and feed load calculations which contain the total connected loads before applying demand factors, the demand factor used, the computed load after applying demand factors, and the type and size of conductors to be used.

- B. SERVICE EQUIPMENT DETAILS: Provide details and diagrams of the number, types and sizes of service entrances, types and sizes of service conductors and all installation requirements including location, assembly, mounting, protection, and the short circuit current available at all supply terminals from the electric utility. Details of wall penetrations and service entrance cable protection shall be shown.
- C. OVERCURRENT PROTECTION: Provide details of all overcurrent protection provisions for equipment and conductors, including sizes, ratings, types and locations.
- D. GROUNDING OF THE ELECTRICAL SYSTEM: Provide complete details of the grounding and bonding provisions including the methods used, the location of connections, and types and sizes of conductors and electrodes.
- E. OUTLETS AND JUNCTION BOXES: Provide installation details and location of all outlet, switch and junction boxes. NOTE: Do not locate outlet boxes and/or other devices and/or back boxes back to back in "Party" or "Fire Walls."
- F. SINGLE LINE DIAGRAM OF ELECTRICAL INSTALLATION: Provide schematic plans showing branch circuit distribution system, cable TV systems, telephone systems, television antenna systems, emergency call systems, emergency lighting systems, fire alarm systems including the details and identification of all circuits, outlets, appliances and equipment. Provide panel schedules for each scheduled panel.
- G. YARD LIGHTING: Lighting of all public spaces within the buildings and grounds, including controls, shall be shown on the drawings.

#### 18. SPECIFICATIONS

The specifications shall be divided into sections separately describing the work to be done by each of the trades including landscaping work and off-site construction which is essential to the completion of the project. The CSI format shall be used exclusively unless prior approval to use another system is granted by the Maine State Housing Authority. The format shall be as follows:

##### A. COVER SHEET

Printed in black or blue on white paper, stating:

1. Title of project.
2. The Maine State Housing Authority's project number, and
3. Project location.

##### B. SIGNATURE BLOCK

Signature block setting forth space for the following signatures:

	Signature	Date
Architect	_____	_____
Owner	_____	_____
Contractor	_____	_____
MSHA	_____	_____
Lender	_____	_____

##### C. INDEX

INDEX CONTAINING REFERENCE TO EACH CATEGORY of work by title and page number. Organization shall be that used by the CONSTRUCTION SPECIFICATIONS INSTITUTE.

In each section, under the Trade Title, a complete description, in specific detail, of all the work to be performed by that trade, including descriptions of "Scope of Work", "Workmanship", and "Materials" and the manufacturer, grade or model designation of each item of equipment as well as any necessary specific instructions for

coordinating the work with that of other trades, also specific instruction and detailed descriptions of work not clearly evident from the drawings.

**D. CONTRACT FORM**

1. The contract should reference the scope of work or plans, specs and addenda by the most recent revision date.
2. Contracts for large projects should contain a detailed schedule of values and unit prices.
3. The contract should specify a specific completion date or number of calendar days to complete the project.
4. The contract should specify amount and terms of liquidated damages and/or early completion bonus.
5. The contract should specify that the owner will retain a percentage of the billed amount until the project is complete. The preferred retainage language is: "Retainage shall be 10% and may be reduced, at the owner's discretion, when the amount of retainage equals 50% of the contract value (including change orders)."
6. A MSHA Construction Analyst must sign all change proposals and/or change orders before they are a valid amendment to the contract.

**19. OTHER**

- A. REVISED COST ESTIMATES
- B. DESIGN PROFESSIONAL'S CERTIFICATION (See appendix B)
- C. TRANSMITTAL FORM
- D. LETTER OF ACCEPTANCE OR PERMIT from the State Fire Marshal's office
- E. LETTER OF ACCEPTANCE OR PERMIT from the Local Building Department
- F. LETTER OF ACCEPTANCE from the Department of Health Engineering (If applicable)

**ADMINISTRATIVE SUBMITTAL PROCEDURES:** Once the completion of the review of Construction Documents and the correction of all discrepancies and/or omissions has been accomplished, the final submission becomes purely an administrative function.

The Design Professional submits at a minimum five (5) "clean" copies of the Drawings, Specifications, and Certifications for sing-off by all interested parties. All drawing sheets are to be sealed by the Design Professional and all drawing sheets relating to work done by other professionals shall bear their seal also. The cover sheet of the specifications and plans shall also bear the Design Professional's seal also. The cover sheet of the specifications and plans shall also bear the Design Professional's seal as well as his signature. One set of documents shall be retained by the Authority for its own use. Two of the sets of documents shall be retained by the contractor, one for his records and one for on site use by all parties. One set of the documents is to be retained by the Owner. Any additional sets of signed documents (more than the 5 outlined above) must also be submitted to the MSHA for signatures.

**E. AS-BUILT DOCUMENTS - 1 COPY FOR MSHA**

Subsequent to the completion of construction, an as built survey is required of all parties. The survey shall be based on the original Boundary Survey, shall be prepared by the same surveyor who prepared



the original Boundary Survey and shall incorporate all physical improvements to the site. The surveyor shall attest to the location of buildings, roads, walks, utilities, fences, etc. (See the Maine State Housing Authority's Real Property Survey Certification in the Appendix)

The Survey Plan is to contain at a minimum the following on one drawing:

- A. Physical indications of boundaries, such as monuments, markers, and fences and all encroachments or deviations from the legal description of the property.
- B. Locations of easements both public and private, rights-of-way, set back lines or special use limitations required by deed or any other written agreements.
- C. Name, dimensional width and location of streets, drives, roads, alleys, curbs, bridges, culverts, walks both on and adjacent to the project.
- D. Locations (in plan only) of storm and sanitary sewers and their manholes including those on or adjacent to the project.
- E. Locations of all other above ground or underground utilities such as water, electric, telephone, cable T.V., etc.
- F. Dimensioned locations of Buildings and other structures relative to the above referenced improvements and the property boundaries.

As built drawings and Operations Manuals for all equipment shall be prepared by the contractor and provided to the Owner. One copy of the as-builts shall also be provided to MSHA.

At completion the Design Professional is to submit his Completion Certification. (See Appendix)

**END OF PART 2**

## **PART 3**

### **PROJECT DELIVERY METHODS**

#### **A. GENERAL**

The development of a project involves the evaluation of ideas, building and use programs, budgets, and time and, as such, the project team and delivery method utilized must work together to achieve the overall project goals. The Authority recognizes that not all projects fit within the same parameters and, therefore, recognizes two viable project delivery methods, which may be considered for its projects. Specifically, the traditional Design – Bid – Build project delivery has been used successfully in the past and is, in most cases, viewed as the most open, competitive, best value project delivery method. The Construction Manager – At – Risk project delivery method has been and will likely continue to be used when there are demonstrated and accepted advantages for such an approach. Understanding that both methods have their own inherent strengths and weaknesses to achieving cost effective, timely, construction, the MSHA has set forth parameters for consideration for each project delivery method.

#### **B. DESIGN – BID – BUILD**

Because there are sometimes Federal monies included in the financing of projects and the goal to let the competitive marketplace dictate the lowest possible costs for the work, the Authority prefers the Design – Bid – Build approach to project delivery. Further, rather than requiring completely “open bidding,” MSHA generally supports a “pre-qualified” bidders approach. MSHA recommends that a minimum of 4 bids be secured for each project utilizing the Design – Bid – Build approach to project delivery.

Traditionally, the Owner selects an architect of choice with whom he prefers to work, usually based on professional qualifications and experience and who is qualified to meet all of MSHA’s requirements and standards. The Architect, based on the Owner’s program requirements including the project budget, then provides design documents for the pre-conceptual, conceptual, design development, and construction documents phases of the project development. The Architect and his design consultants, who normally include civil, structural, mechanical, and electrical engineers, are expected to design within a construction budget set by the Owner and the Authority at the onset. The Architect and consultants will be responsible for estimating the design and advising the Owner of the expected construction costs, based on their respective experience, for each phase of the design process, and the Architect is responsible for communicating the entire design intent through accurate, complete, and well coordinated construction documents (plans, project manual, and specifications) such that the project can be put out for competitive bidding.

Once the design is complete and the expected costs are estimated by the Architect and the entire package is acceptable to the Owner and to the Authority, the project is advertised for bidding. A bidding procedure and time frame is set up and contractors, including generals, subcontractors, suppliers, and venders, assemble their prices based on the content of the documents and submit “bids” to accomplish the work per the parameters set forth by the Architect and his consultants in the bidding documents. Subcontractors, suppliers, and venders “bid” for their respective scopes of work to the general contractors (GC) and the

GC's submit their bid for the entire project using a combination of their own estimates, the bids they receive, and their proposed methods of executing the work. Unless there is some irregularity discovered just after the bids are received, usually the low bidder is offered the project, assuming that it is within the project budget as set by the Owner. MSHA's Construction Services shall be included and participate throughout the bidding process.

During the construction period, the Architect is retained by the Owner to administer the terms and conditions of the construction contract between the Owner and the General Contractor and to provide field oversight to assure that the design intent, the construction schedule, and the expected quality are met.

With this project delivery method, the Owner has a contract with the Designer of Record for all design services and the Designer of Record has agreements for the professional services of his consultants. The Owner has a contract with the low bidder/General Contractor for the construction.

Focus points of emphasis related to this method of project delivery:

- It is perceived to be the method that is most "fair" to the construction industry generally resulting in the lowest cost for the construction phase based on competition for the work.
- The design intent is communicated solely through the documents – they are the basis of the bid, the relationships during construction, and the construction contract. The documents must be complete, properly coordinated, and timely.
- Change Orders result if the documents are incomplete, not coordinated, or the intent is not clear.
- The Architect administers the Construction Contract and continues to provide services on an as-needed basis as the construction takes place.

### **C. CONSTRUCTION MANAGER - AT - RISK**

The Authority recognizes that certain projects, such as substantial rehabilitation projects or very complex new construction projects, may benefit from a Construction Manager - At - Risk form of project delivery. The project applicant must request consideration at the pre-concept design stage and make a presentation as to why this project delivery method will benefit the project. The MSHA's Construction Services will review each request on a case-by-case basis and advise the Director of the Development Division as to the appropriateness of this method for each project. The decision of the Development Director shall be final.

In this scenario, the owner hires an Architect as described above. The Owner and the Architect get together and discuss criteria that they are looking for in a Construction-Manager-At-Risk and choose to openly advertise for qualifications of Construction Managers (CM's), develop a list of qualified CM's (minimum of 4), interview, make a selection, and negotiate a contract for services. MSHA's Construction Services shall be included and participate throughout the selection process.

With this project delivery method, a "team" is set up very early in the design process, which includes the Owner, the Architect (and his engineering consultants), and the Construction Manager. The traditional design phases of pre-concept, concept, design development, and construction documents are followed however, the CM has the responsibility of developing

all estimates, not the Architect. The CM also has the added responsibility of offering input to the Owner and Architect for alternatives to achieve the design intent and to maintain the construction budget. All team members participate in the decision making process as the design evolves and all parties are expected to communicate their ideas, concerns, etc. openly and freely to the betterment of the project.

During the final pricing at the construction documents stage, the CM is responsible for soliciting multiple/competitive quotes (a minimum of 3 in each trade or work scope) from suppliers, vendors, and subcontractors and usually selects companies that he has pre-qualified to provide the necessary scopes of work, rather than simply opening it up to all. This helps to assure that the entire construction team will work well together. All of the prices are tabulated and the CM makes recommendations to the project team on which subs are best qualified to the other members of the project team. Once the construction team is assembled and a final price put together, the construction process begins.

With this project delivery method, the Owner has a contract with the Designer of Record for all design services and the Designer of Record has agreements for the professional services of his consultants. The Owner has a two-part contract with the CM: Part 1, for pre-construction services and Part 2, for the actual construction.

Focus points of emphasis related to this method of project delivery:

- The Owner and Architect must be willing, qualified, and committed to administer and participate in the pre-construction services portion of the project with the CM.
- The Owner and Architect must carefully define the level of services and the pre-qualifications they require of the CM and conduct an interview/selection process that results in the best possible project team.
- The CM must be qualified and be held accountable and actively participate during the pre-construction phases of the project.
- The CM has the responsibility for soliciting competitive pricing by assembling and administering a “bidding” process for all trades and major scopes of work and establishes a Guaranteed Maximum Price (GMP) which all parties can rely upon. In order to assure a competitive pricing process occurs, the CM must strive to solicit competitive pricing.
- The CM should be careful not to exclude suppliers, subcontractors, and vendors who might otherwise provide quotes in a traditional bid project delivery.
- Usually the form of contract for the construction phase is based on the costs of the work plus a negotiated flat fee. Financial incentives for both the owner and/or the CM are also usually discussed and negotiated and might include considerations for early completion and actual costs vs. estimated costs. These incentives are usually structured in such a way to encourage the CM to continue to find the best value for the Owner during the construction phase.
- The design intent is communicated through the documents and through the ongoing participation of the project team members. The CM assumes a level of understanding beyond the documents by actively participating in the decision making and design processes during the pre-preconstruction phase of the project development.
- The Architect administers the Construction Contract and continues to provide services on an as-needed basis as the construction takes place.

- The Owner must hold the CM accountable for justifying all costs related to the project. A full accounting shall be provided by the CM for review by the Owner and/or his agents.

#### **D. GENERAL CONDITIONS OF CONSTRUCTION AND QUALITY CONTROL**

##### **1. Standards for Construction and Contractor's Warranty:**

- A. The Project shall be constructed according to accepted Construction Documents and in full compliance with applicable building codes and regulations. All materials and equipment shall be new, unless otherwise specified, and all construction shall be of good quality, free from faults and defects.
- B. The Contractor warrants to the Owner, the Design Professional, and the Maine State Housing Authority that all construction will be accomplished in compliance with the Standards for Construction stated above.

##### **2. Notwithstanding any additional requirements imposed by either the architect or the Owner in the construction contract, or the Construction Lender, Construction Contract Retainage shall be:**

- A. For construction contracts less than \$100,000 stipulated sum or guaranteed maximum, MSHA does not require construction contract retainage.
- B. For construction contracts more than \$100,000 but less than \$200,000 stipulated sum or guaranteed maximum, MSHA may waive its retainage requirements. If not waived, retainage shall be 10% on all progress payments until the project is complete.
- C. For construction contracts more than \$200,000 stipulated sum or guaranteed maximum, MSHA requires 10% retainage on all progress payments until the project is 50% complete. Once the dollar value of the work scope meets or exceeds 50% of the contract value (including change orders) then the contractor may request that no further retainage be withheld. With agreement from the architect, Owner, and MSHA, no further retainage shall be withheld.

##### **3. The Contractor shall provide the following on-site facilities:**

- A. A site office of sufficient size for the review and discussion of the construction documents
- B. A site phone
- C. A site toilet
- D. A current set of signed drawings, specifications, and other documents as amended and as accepted by the Authority for the use of the Authority inspector at all times.
- E. A "project sign" which designates the project as an Equal Housing Opportunity project and includes references to the Project name, Developer, Architect, Contractor, Bank, Bonding Company, and the Authority. This sign should also provide a phone number for rental information.

##### **4. Quality Control Inspections**

The Authority requires inspections of the construction by the designer of record to determine that work is proceeding according to the Standards for Construction stated above and generally accepted construction practices. The Authority reserves the option to make similar or additional inspections for the same purposes. These inspections shall generally be as follows for each building and/or unit:

- A. Initial excavations; the following items shall be completed and visible for inspections:
  1. all excavation for footings and foundations;
  2. forms for footings and any required footing reinforcing steel in place; and

3. batter boards or other suitable locating devices in place and wall lines established
- B. Foundation Preparation; the following items shall be completed and visible for inspection:
1. forms for walls and any required reinforcing in place; and
  2. forms shall be aligned, securely braced, and properly treated with release agents.
- C. Foundation Completed; the following items shall be completed and visible for inspection prior to placing backfill:
1. all footings, foundation walls, piers, and any other foundation work, including rodent barriers;
  2. damp proofing or water-proofing and foundation drainage installations
- D. Concrete Slabs; an inspection of the noncapillary bed, slab vapor, barrier, below slab insulations, embedded piping including drainage and radon systems, reinforcing steel, etc. shall be made prior to the placement of concrete floor slabs.
- E. Close-In; a “close-in” inspection is required to inspect work completed after the initial inspections and prior to the concealment of all building systems. The following construction shall be completed and visible for inspection:
1. the structure shall be enclosed with all wall, ceiling, and roof framing exposed;
  2. masonry veneer, if applicable, shall not be installed;
  3. interior wall and ceiling finish material and insulation shall not be installed, but
  4. roofing may be applied;
  5. heating, plumbing and electrical work shall be roughed in;
  6. footings and foundations for stoops, porches and terraces before backfilling, with any required reinforcing and flashing for slabs in place, before pouring slabs, if not inspected during previous inspections.
  7. All air-barriers shall be established and be sealed including, but not limited to, all mechanical and electrical penetrations in framing.
- F. Final Inspection; at “final inspection,” all required construction shall be completed and ready for inspection. The Contractor shall arrange to have the building(s) open for the Architect and Authority. The following items shall be completed and ready for inspection:
1. the dwelling structure completed, cleaned and ready for occupancy - this shall include the installation and operation of permanent equipment, buildings and on-site improvements except for those items specified and accepted as suitable for deferred completion in accordance with the provision for Uncompleted Work Escrows;
  2. finish grading, seeding, sodding, and landscape planting completed;
  3. walks and drives completed, including their extension to the public walk, curb or pavement, and utilities installed including their extension and connection to off-site public mains;
  4. fences, garden walls, retaining walls, and other accessory structures completed;
  5. off-site improvements, if any, completed;
  6. all non-compliances noted by the Architect and/or Authority during the construction shall have been corrected and accepted by the Architect and the Authority.

## 5. Concealments

If the Authority encounters construction that has been concealed before being properly inspected as required by a scheduled inspection or a follow-up thereto, MSHA may require the uncovering of concealed work or an alternative verification acceptable to the Authority. The Authority shall not be liable for the cost of any such uncovering or alternative verification.

## 6. Re-inspections

Any inspection performed with the Authority in its sole discretion determines to be necessary due to an action, omission, or deficiency caused by the Contractor, Owner, or Design Professional shall be considered a re-inspection. Re-inspections shall be made after corrections have been completed and the Contractor or Architect shall notify the Authority of the status of all reinspections.

## 7. Inspection Documentation

A report is to be provided to the Contractor following each inspection or reinspection by the architect. The Contractor must carefully review his copy of the report and correct any non-compliance. Copies of all reports are also to be submitted to MSHA.

The Authority will generally rely on the Architect's field reports and/or meeting minutes for the proper documentation and tracking of all required inspections and/or re-inspections.

## 8. Corrective Actions

Upon its sole determination that the construction is not proceeding in compliance with the Standards for Construction, the Authority may require of either the Contractor or the Owner or both any of the following corrective actions:

- A. Repair or correct non-compliance; then notify the Architect and Authority for re-inspection.
- B. Stop construction in area of non-compliance until further notice.
- C. Establish a Full Time Project Representative of the Design Professional.

## 9. Change Orders

Any modifications including, but not limited to, additions, variations, substitutions, or revisions to the Authority accepted Construction Documents shall be submitted to the Authority, the Architect, and Owner for review and acceptance prior to the execution of those changes. All change orders shall be submitted on a Change order form acceptable to the Architect and MSHA and shall be accompanied by adequate information describing the proposed changes including drawings and description of materials when needed. The Authority may request such additional information as it deems reasonably necessary under the circumstances to justify any change order requests. In an effort to expedite approvals for changes, the MSHA may decide to review and approve individual "Change Proposals" as they are presented, understanding that a Change Order will later be developed to summarize and total approved Change Proposals prior to requests for payment of such change items.

## 10. Uncompleted Work Escrows

When completion of site or building improvements is prevented by seasonal conditions or other considerations acceptable to the Authority as being beyond the control of the Contractor, the final inspection shall not include the uncompleted construction, provided the Authority finds that the development can be occupied without hazards caused by such uncompleted work.

The Authority will require a complete written description of all deferred work and the holding in escrow of a sum of money equal to not less than one and one half times the Authority's estimated cost of completion, and the establishment of a suitable date of completion of the deferred items. The Authority will require an inspection of the deferred work upon completion prior to the release of any escrow amount.

In establishing Incomplete Work Escrows (IWE) the Authority will consider the estimated value of the work to be completed as a minimum basis but also may include costs, both direct and indirect, that might be incurred should the Contractor default on his obligations to complete the identified work. The establishment of the IWE amounts is at the sole discretion of the Authority.

#### **E. PROJECT CLOSE-OUT**

As part of the final project accounting, establishment of the incomplete work list and prior to final loan closing, MSHA's Construction Services requires the submittal, review, and acceptance of several documents. A checklist and copies of the required documents are provided in the Appendix.

### **END OF PART 3**



# APPENDIX A

## [MSHA Green Building Standards](#)

# APPENDIX B

## Certifications

## CONCEPT DESIGN CERTIFICATION

MSHA Project Number \_\_\_\_\_ Municipality \_\_\_\_\_

Owner \_\_\_\_\_

Design Professional \_\_\_\_\_

I certify that the attached documents listed below meet the requirements of the Maine State Housing Authority described in the current edition of the Design and Construction Manual and satisfy the requirements of this submission for Concept Design.

Name of Document	Date	Number of Sheets
_____	_____	_____
_____	_____	_____
_____	_____	_____

Signed:

Date:

Design Professional's Seal

(List all documents provided and also note documents to be provided by others if applicable.)

## CONSTRUCTION DOCUMENTS CERTIFICATION

MSHA Project Number \_\_\_\_\_ Municipality \_\_\_\_\_

Owner \_\_\_\_\_

Design Professional \_\_\_\_\_

I certify to my best belief that the attached documents listed below are completed construction documents and meet the requirements of the Maine State Housing Authority described in the current edition of the Design and Construction Manual, and satisfy the requirements of this submission for Construction Documents. I further certify that the proposed construction (or rehabilitation) described by these construction documents are consistent with the Proposal approved by MSHA, and that the proposed construction (or rehabilitation) in accordance with these plans and specifications is permissible under the applicable zoning, building, housing and other codes, ordinances, or regulations as modified by any waivers obtained from the appropriate officials.

I further certify to my best belief that the construction documents are in compliance with the Maine State Housing Authority Design and Construction Standards. I take responsibility for the correction of any problems of construction arising from errors or omissions of these construction documents.

Name of Document	Date	Number of Sheets
_____	_____	_____
_____	_____	_____
_____	_____	_____

Signed:

Date:

Design Professional's Seal

(List all documents provided and also note documents to be provided by others if applicable.)

## CONSTRUCTION COMPLETION CERTIFICATION

MSHA Project Number \_\_\_\_\_ Municipality \_\_\_\_\_

Owner \_\_\_\_\_

Design Professional \_\_\_\_\_

I certify that the project has been completed to my knowledge, information, and belief in accordance with the requirements of the Construction Documents and any modifications to them in accordance with any Change Orders approved by the Maine State Housing Authority listed below, except for defects or deficiencies listed in the attached punch list, including incomplete work awaiting seasonal opportunity, which shall be subject to later, separate certification upon periodic visits to the site to familiarize myself generally with the progress and quality of the work and to determine in general if the work was proceeding in accordance with the Construction Documents. I have endeavored to guard the completed development against defects and deficiencies of construction, though not necessarily through exhaustive or continuous on-site inspections to check the quality or quantity of the construction.

Change Orders

Date

MSHA Approval Date

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Attach copy of punch list

Signed:

Date:

Design Professional's Seal

Attach proof of professional liability insurance covering errors and omissions in the architect's professional services on this project in an amount reasonable for the amount of construction.

## REAL PROPERTY SURVEY CERTIFICATION

To all persons interested in title to the real property (Property) described in Deed (s) of (Grantor (s)) to (Grantee (s) ) dated (            ) and recorded in the (            ) County Registry of Deeds, Book \_\_\_\_\_ Page \_\_\_\_\_, the undersigned certifies to (1) (Developer), (2) (Bank), (3) the Maine State Housing Authority and (4) the \_\_\_\_\_ Title Insurance Company that the drawing hereon (Drawing) is an accurate representation of a survey made by the undersigned according to standard surveying practice, that the Drawing accurately portrays the relative location on the Property of any improvements, encroachments, easements, (whether appurtenant or encumbering) and other matters revealed by such survey, that the perimeter of the Property was established by actual field measurements, that the monuments were found or set as shown hereon and that all property interests of whatever nature depicted are contiguous along their entire common boundaries and are enclosed within the boundaries depicted. The undersigned further certifies that there are no encroachments, easements, or other inconsistencies pertaining to the Property other than those shown hereon. The survey was a (transit theodolite) survey made according to the U.S. Standard of Measurements.

SURVEYOR COMPANY

By: \_\_\_\_\_

(SEAL)

**EXPLANATORY NOTE:** The Survey Certification should be made to appear on all copies of the Survey and should not be provided as a separate attachment to the Survey. The Survey, the Survey Certification and the property description provided at Notice to Proceed Phase Submission should pertain to and identify all real property which will be described in the Mortgage and Security Agreement which will be purchased by the Authority at the time of permanent loan closing. Shortly before the permanent loan closing, the Survey and the Survey Certification should be updated to conform to the Authority's As-Built Survey Criteria and to reflect all current title information with respect to the Owner's property.



# APPENDIX C

## **Project Close-Out Checklist and Forms**

**Project:**  
**Address:**

**CONSTRUCTION SERVICES  
COMPLETION CHECKLIST**

1.		Architect	Certificate of Substantial Completion (AIA document normally prepared by architect)
2.		Architect	Architects Certificate of Punchlist Completion (MSHA Document or letter from Design Professional)
3.		Contractor	Elevator License (if applicable)
4.		Contractor	Fire Alarm system Test Report and Sign-off by System Manufacturer's Rep
5.		Contractor	Sprinkler Test Report/Sign-off by qualified installer and SFMO permit signed-off by "RMS"
6.		Contractor	Certificate of Occupancy from local municipality
7.		Contractor	Electrical Permit Sign-off by state or local electrical inspector
8.		Contractor	Plumbing Permit Sign-off by state or local plumbing inspector
9.		Architect	Certificate of Completion of Design Professional ( <b>MSHA Document</b> )
10.		All	Incomplete Work Escrow list with each item monetized and total value multiplied by 1.5
11.		Contractor	Requisition for all items not identified on Incomplete Work Escrow list ( item #10 )
12.		Contractor	Lien Releases (typically using <b>MSHA's Contractors Final Certificate and Release Form</b> )
13.		Contractor	O & M manuals (deliver to Owner)... <i>as applicable</i>
14.		Contractor	Warranty information to Owner (e.g. Roofing, Boilers.) ... <i>as applicable</i>
15.		Contractor	As-built drawings (deliver to Owner, copy to MSHA)
16.		Owner	As-built survey with MSHA Certification (may be waived if work did not increase building foot print)
17.		Contractor	State Fire Marshal Inspection and Plan of Correction (if required)
18.		Owner	Owner/Agency Certificate of Completion ( <b>MSHA Doc.</b> )
19.		Contractor	Contractor's report of participation - Minority/Women Owned Business Enterprises ( <b>MSHA doc.</b> )
20.		Contractor	Evidence of satisfactory Lead Based Paint Clearance testing (not required for new construction)
21.		Contractor	Consent of Surety to release of final payment

\* Required     Not Required     Required unless covered under local Certificate of Occupancy  
**Technical Services has received and reviewed the documents outlined above and find them  
suitable to satisfy closeout/completion requirements per the Division of Construction Services:**

/Construction Analyst :	Date:
Don McGilvery/Construction Services Manager :	Date:



CERTIFICATE OF COMPLETION OF DESIGN PROFESSIONAL

**Project:** \_\_\_\_\_

**Project Address:** \_\_\_\_\_

**Architect/Engineer:** \_\_\_\_\_

I certify that the construction/improvements to the above-named project have been completed to my knowledge, information and belief in accordance with the contract documents including any change orders approved by Maine State Housing Authority. I have endeavored to guard the completed work against defects and deficiencies of construction, though not necessarily through exhaustive or continuous on-site inspections to check the quality of the construction.

<b>Change Order</b>	<b>Date</b>	<b>MSHA Approval Date</b>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**Architect/Engineer:** \_\_\_\_\_

**Title:** \_\_\_\_\_

\_\_\_\_\_  
*Signature of Design Professional*

**Date:** \_\_\_\_\_

**CONTRACTOR'S FINAL CERTIFICATE AND RELEASE**

*Any material supplier or subcontractor who supplied material or labor with a value greater than or equal to \$2,000 must complete this form.*

PROJECT: \_\_\_\_\_

Contract Date: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

Contract Amount: \$ \_\_\_\_\_

Contract For: \_\_\_\_\_

1. The undersigned certifies that there is due and payable under the above contract a final payment of \$ \_\_\_\_\_.
2. The undersigned certifies that all work required under this contract has been performed in accordance with the terms of the contract and was completed on \_\_\_\_\_, 2004.
3. The undersigned certifies that, except as set forth above, there are no unpaid claims for materials, supplies or equipment and no claims of laborers or mechanics for unpaid wages arising out of the performance of the contract.
4. The undersigned releases any and all claims, other than for the final payment set forth above, arising under or by virtue of the contract and agrees to indemnify the Maine State Housing Authority and the owner against any such claims.
5. The undersigned certifies that lead-based paints have not been used in the painting of any interior surfaces or those exterior surfaces that are readily accessible to children under six (6) years of age. Lead-based paints are defined as those paints containing more than 0.5% lead by weight in the non-volatile content of the paint.
6. The undersigned has attached to this certificate all manufacturers' and suppliers' written guarantees and warranties covering materials and equipment furnished under the contract.

Contractor: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

State of Maine

County of \_\_\_\_\_, ss.

Date: \_\_\_\_\_

Personally appeared the above-named \_\_\_\_\_ and gave oath to the foregoing.

Before me,

\_\_\_\_\_  
Name

Notary Public of Maine/Attorney-at-Law

My Commission Expires: \_\_\_\_\_

### Incomplete Work Escrow

Project (name/address): \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Contractor: \_\_\_\_\_

Architect: \_\_\_\_\_

The following items represent project features that have been determined to be incomplete as the result of:

- ☐ Seasonal limitations.
- ☐ Extraordinary circumstances w/MSHA concurrence

	Description	\$
Value		

	Total:
	Total x 150%

The amount of \$\_\_\_\_\_ shall be withheld from the final payment till such time that work has been completed and determined acceptable by the Owner and representative of MSHA.

Work shall be completed by: \_\_\_\_\_

Upon acceptance of all items in an escrow section, the Authority will prepare a release of those funds being withheld against those work items. At no time shall an aggregate amount exceeding 50% of the total escrow amount be released prior to completion of all escrow items.

\_\_\_\_\_  
Contractor

\_\_\_\_\_  
Owner(s)

\_\_\_\_\_  
Architect

**OWNER/AGENCY CERTIFICATE OF COMPLETION**

Owner(s): \_\_\_\_\_

Property Address: \_\_\_\_\_

MSHA Project #: \_\_\_\_\_ Number of Units: \_\_\_\_\_

The undersigned Owner(s) certifies as follows:

1. The loan funds I have received from the Maine State Housing Authority to undertake property improvements have now been appropriately spent.
2. The improvements for which I used the money have been completed to my satisfaction and are the same improvements listed in Exhibit "A" of the Rehab Escrow or as listed in the Technical Services Document Sign Off, except as amended with the prior written consent of the Maine State Housing Authority.
3. The attached List of Tenants and Income is complete and accurate as of this date. (List all units, if vacant so note)

The undersigned Owner(s) swears under penalty of law that he/she/they have read and understood this Certificate and that to the best of his/her/their knowledge and belief it is true.

OWNER:

By: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_  
By: \_\_\_\_\_ Date: \_\_\_\_\_  
Name: \_\_\_\_\_

APPROVAL BY MSHA:

By: \_\_\_\_\_ Date: \_\_\_\_\_

---

**MAINE STATE HOUSING AUTHORITY USE ONLY**Final Escrow Draw occurred on: \_\_\_\_\_ Remaining Escrow Funds: \_\_\_\_\_  
(date)Recommended initial annual inspection: \_\_\_\_\_ Remaining funds to: \_\_\_\_\_  
(month/year)

CC: Legal; Asset Management; Development Manager

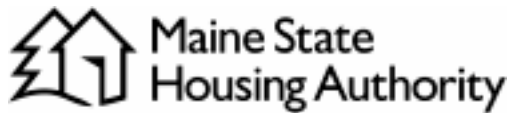


Maine State  
Housing Authority

## List of Tenants and Income

NOTE: Please place an asterisk beside any units receiving Section 8 assistance.

[illegible]



## CONTRACTORS REPORT OF PARTICIPATION W/M

**Project:**

**Owner:**

**Contractor:**

**Date:**

\_\_\_\_\_ is a Women/Minority owned Business Enterprise.  
\_\_\_\_\_ (contractor) \_\_\_\_\_ is not a Women/Minority owned Business Enterprise

**During the course of the above referenced project, the Contractor:**

\_\_\_\_\_ Used the services of Women/Minority owned Business Enterprises as listed;

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ Did not use the services of Women/Minority owned Business Enterprises.

**Signed:**

**Contractor:** \_\_\_\_\_

**Date:** \_\_\_\_\_

# APPENDIX D

## AMENDMENTS